Service manual

Leica M500 OH3

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Leica
MICROSYSTEMS

Service manual

Leica M500 OH3

Stand for neuro surgical microscopes

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Version 05/03

This documentation does not include the service documentation about the Leica M500 N microscope system. Find it in the documentation 10665607.

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Leica M500 OH3

User manual

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User manual

This user manual contains important safety precautions as well as information on setting up the instrument (see the chapter entitled «Safety precautions»).
Before attempting to set up the product carefully read through the user manual.

Product identification

The model and serial number of your product are located on the identification label on the illumination unit. Copy this information into your user manual and always refer to it if you have questions for our representatives or service locations.

Model: Serial No.:

Symbols used in this manual

The symbols used in this user manual have the following meaning:

Warning This indicates a potentially hazardous situation which could result in death or serious injury.

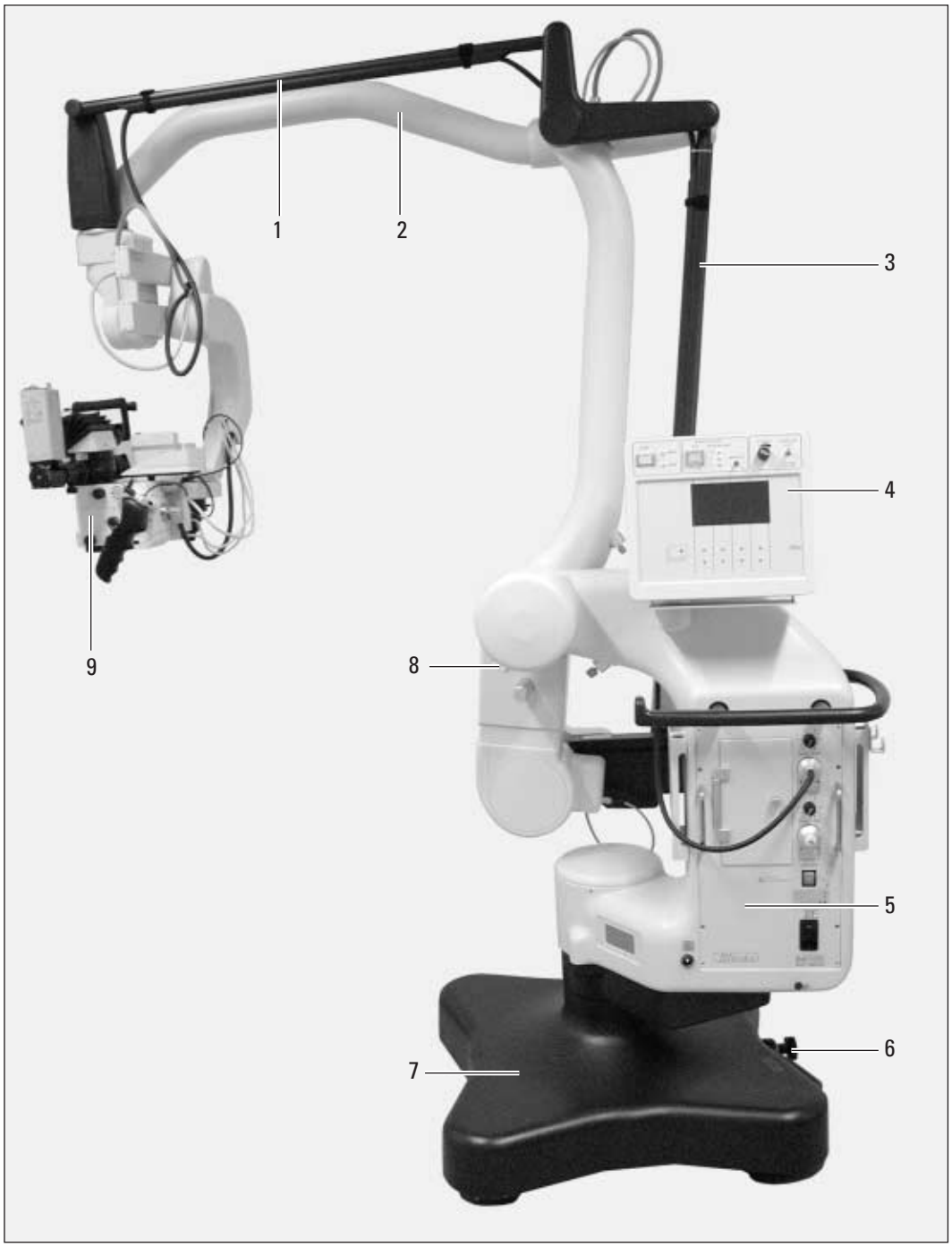
Caution Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury and/or appreciable material, financial and environmental damage. It may also be used to alert against unsafe practices.

Important paragraphs, which must be adhered to in practice as they enable the product to be used in a technically-correct and efficient manner.

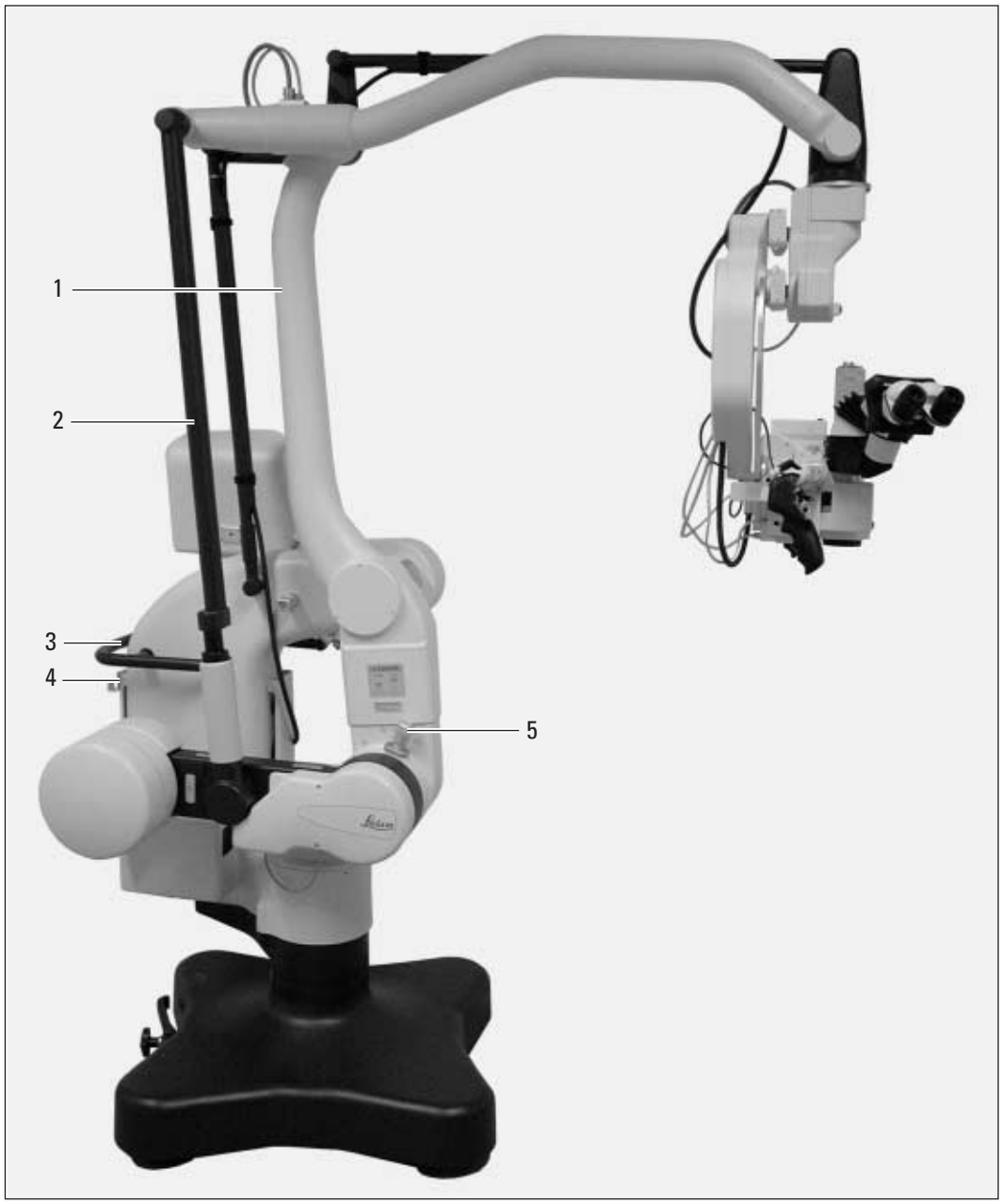
⇨ Indicates that you have to do something.

Overview

Leica M500 OH3 surgical microscope system



1 Horizontal cable channel
2 Swing arm
3 Vertical cable channel
4 Control unit
5 Illumination unit
6 Footbrake
7 Foot
8 Locking knob
9 Leica M500 N microscope

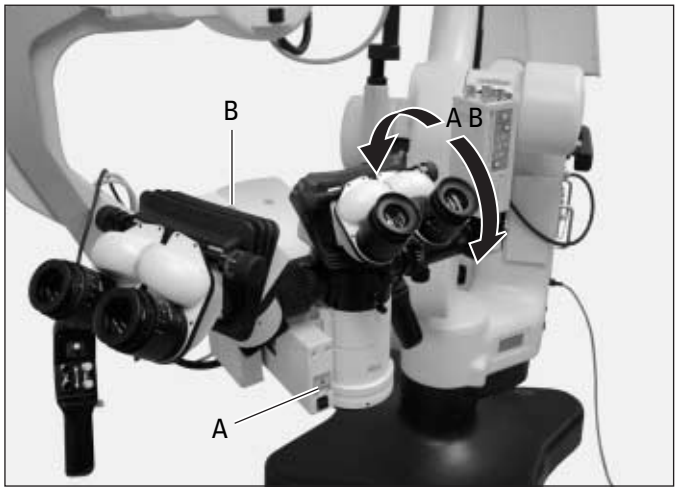


1 Vertical arm
2 Tension rod
3 Handle
4 Footswitch holder
5 Locking knob

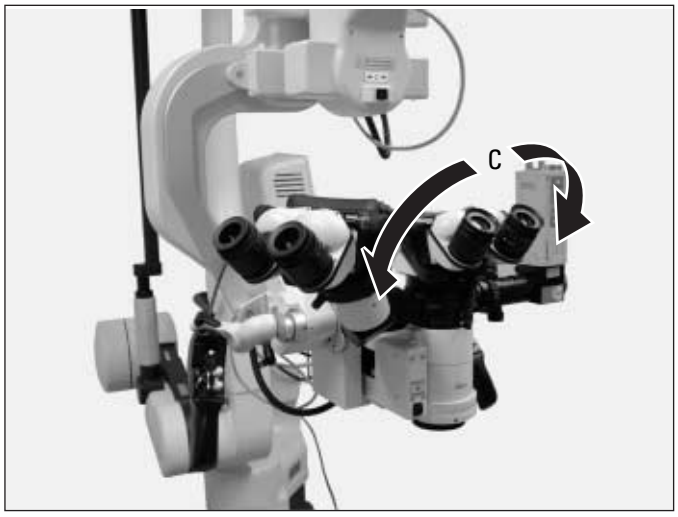
Function

Balancing system and brakes
The Leica M500 OH3 surgical microscope consists of the Leica M500 N surgical microscope and the Leica OH3 floor stand.

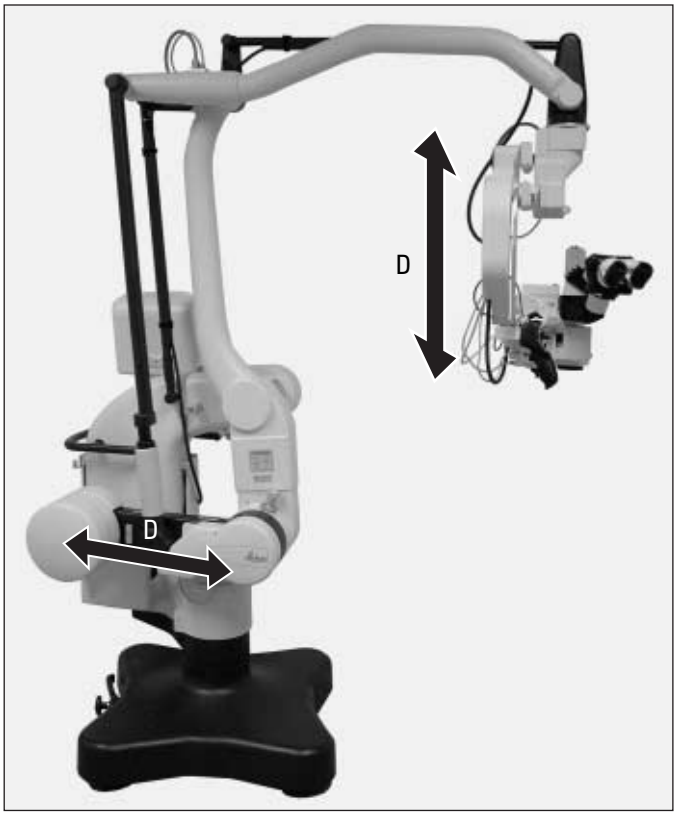
The stand and surgical microscope are balanced out by the balancing system. All movements which must be carried out during the surgery require only minimal force.
The AB swivel movement is balanced out via the A and B pinion.



Movement C is balanced out at the microscope carrier.

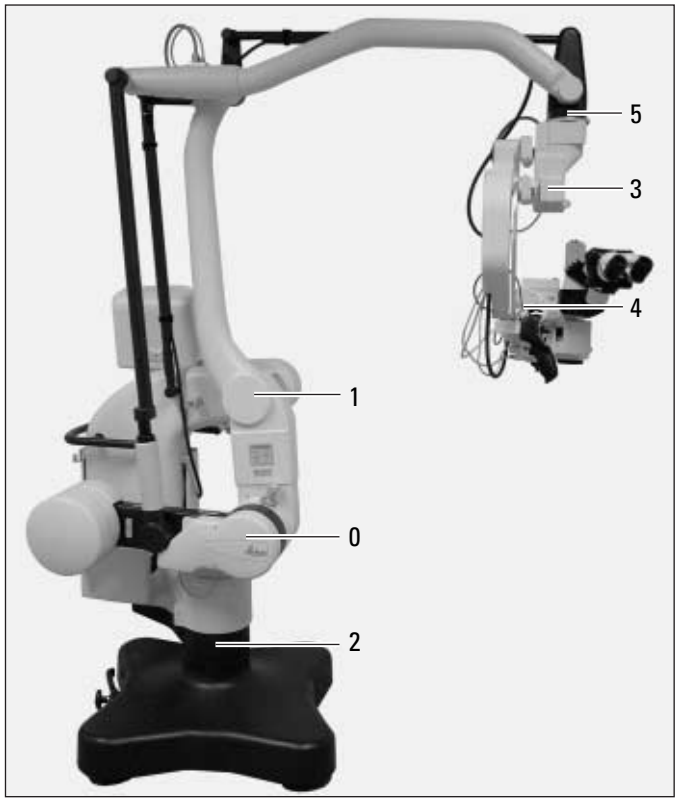


The internal weight of the stand balances the weight of the surgical microscope and the fitted accessories (movement D).

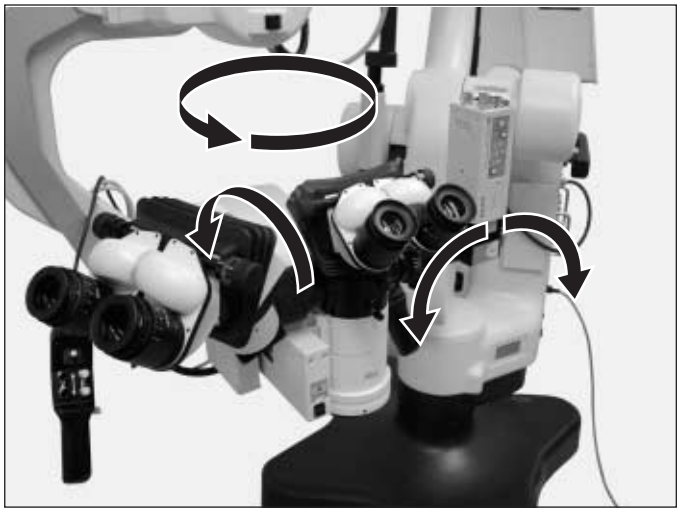


There are 6 electromagnetic brakes on the Leica M500 OH3 surgical microscope, which block movement of the base and surgical microscope:

- up/down and forward/backward in a parallelogram (0 and 1)
- at base (2)
- in microscope carrier (3)
- at A and B sledges of the surgical microscope (4)
- in rotatable joint (5)

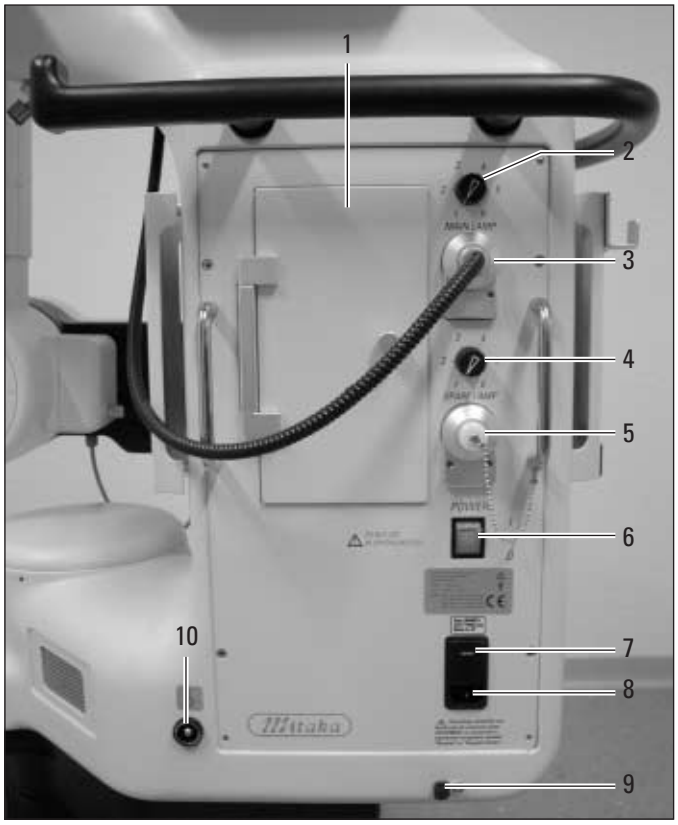


Using the selector switch (Item 10, Page 10) for brakes (XYZ FREE or FOCUS LOCK) at the control unit, two different brake groupings can be selected.
The following movements with the surgical microscope can still be performed if the selector switch is located in the FOCUS LOCK position:



The following movements with the surgical microscope can be performed if the selector switch is located in the XYZ FREE position:

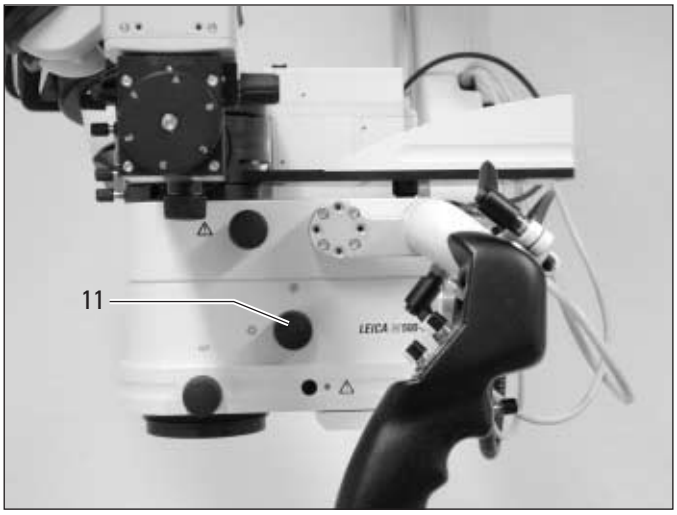
Illumination
The illumination of the Leica M500 OH3 surgical microscope consists of a main illuminator and a backup illuminator.
They are located in the illumination unit.
The main and backup illuminators consist of xenon lamps. The light of the main and backup illuminators is lead to the optics carrier via a fibre-optic cable through the base.
If the main illuminator fails, the plug of the fibre-optic cable is switched over to the backup illumination.



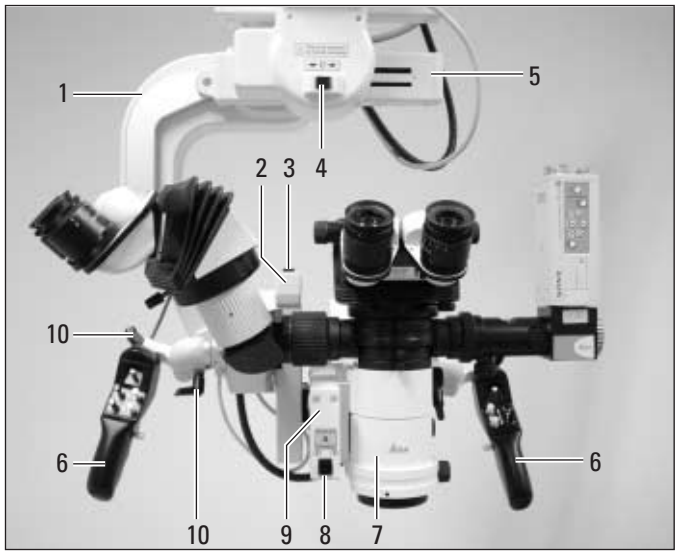
1 Access hatch for lamp inserts of main and backup illuminators
2 Regulating knob for brightness of main illuminator
3 Outlet for fibre-optic light guide of main illuminator
4 Regulating knob for brightness of backup illuminator
5 Outlet for fibre-optic light guide of backup illuminator
6 Power switch of Leica M500 OH3 surgical microscope
7 100 V/120 V/220 V/240 V switch
8 Power connection
9 Pullout fuse for power cable
10 Potential equalisation connector

Two LEDs at the control unit indicate which illuminator is being used at the moment (see Page 18).

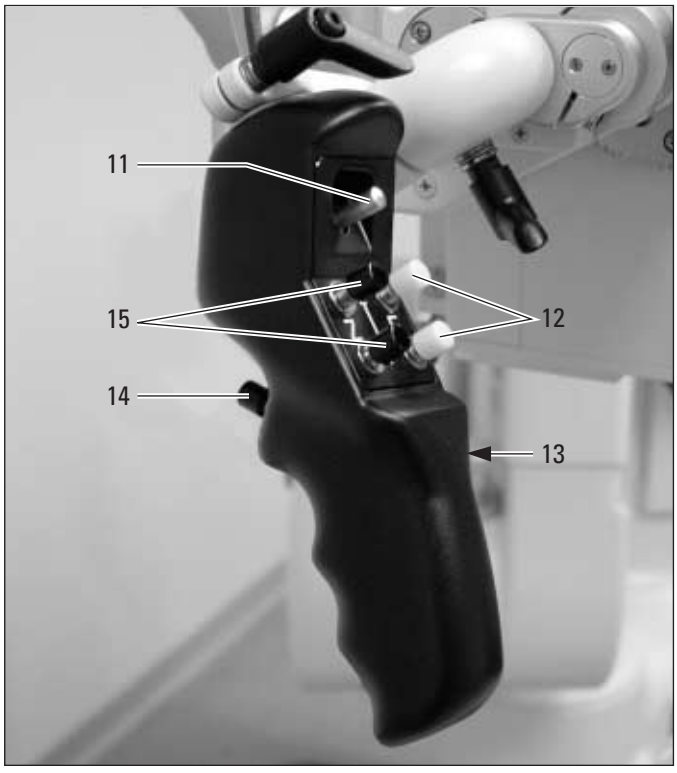
The light field diameter can be concentrated at the optics carrier with the rotary knob (11).



Leica M500 N microscope with microscope carrier

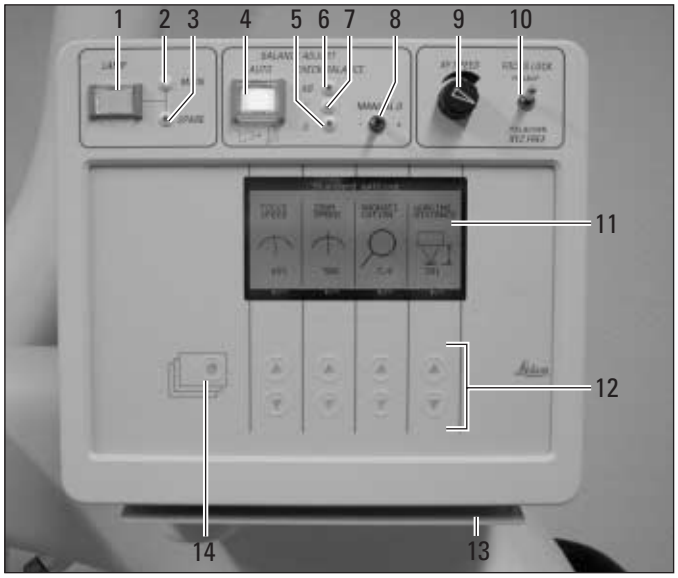


1 Microscope carrier
2 B sledge
3 Switch for manual balancing of the B sledge
4 Switch for manual balancing of the C sledge
5 C sledge
6 Handgrip
7 Optics carrier
8 Switch for manual balancing of the A sledge
9 A sledge
10 Handgrip clamping lever

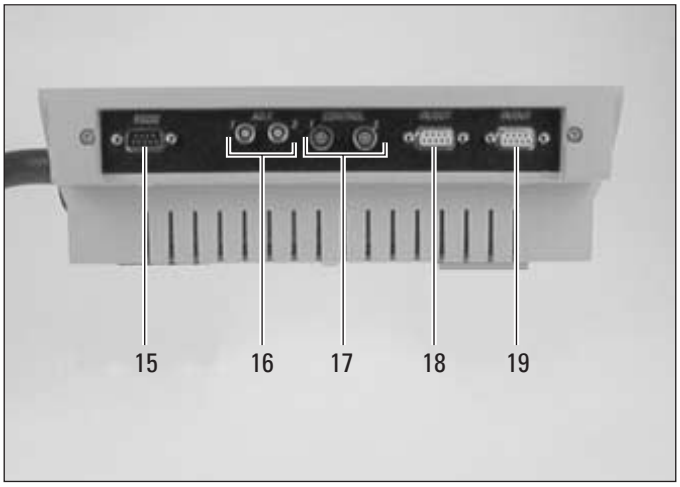


Handgrips (Item 6):
11 Joystick (selectable for XY movement or for menu control in DI C500)
12 Focus
13 Selector button (three brakes)
14 ALL-FREE button (all brakes)
15 Zoom

Control unit

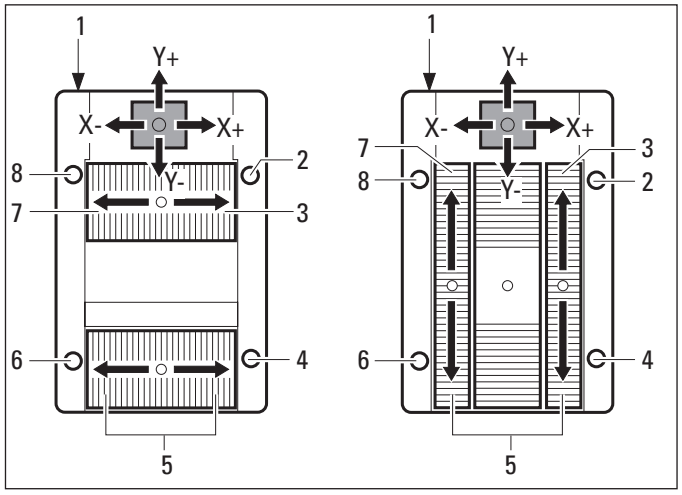


1 Pushbutton for illumination (on/off)
2 LED for main illuminator
3 LED for backup illuminator
4 Pushbutton for auto balance with protective flap
5 LED for balancing of D axis
6 LED for balancing of A/B axis
7 LED for balancing of C axis
8 Toggle switch for manual balancing of D axis
9 Regulating knob for movement speed of the X/Y axes
10 Selector switch for brakes:
- XYZ-Free
- Focus-Lock
11 Display
12 Arrow keys
13 Cover for connections
14 Display key for menu control



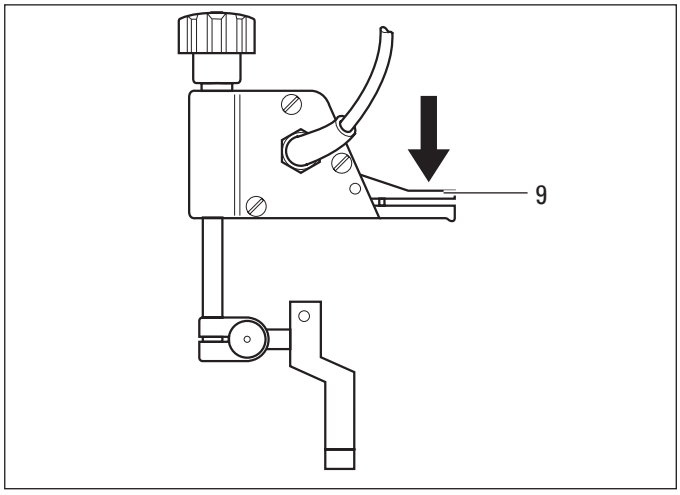
Connections on the underside of the control unit (cover for connections, Item 13 removed):
15 RS-232 interface
16 On/Off connection for external device
17 Footswitches 1 and 2
18 CAN bus interface
19 CAN bus interface

Footswitch



1 Adjustable supports
2 DI C500: Activate/deactivate imaging (On/Off)
3 Focus, short working distance
4 DI C500: Individual switching of shutters
DI C500 with IGS workstation: ENTER menu
5 Zoom (freely configurable; for default configuration, see Page 25)
6 DI C500: Decrease the brightness of the displayed image
DI C500 with IGS workstation: Menu scroll down
7 Focus, long working distance
8 DI C500: Increase the brightness of the displayed image
DI C500 with IGS workstation: Menu scroll up

Mouth switch



9 Brakes XYZ FREE

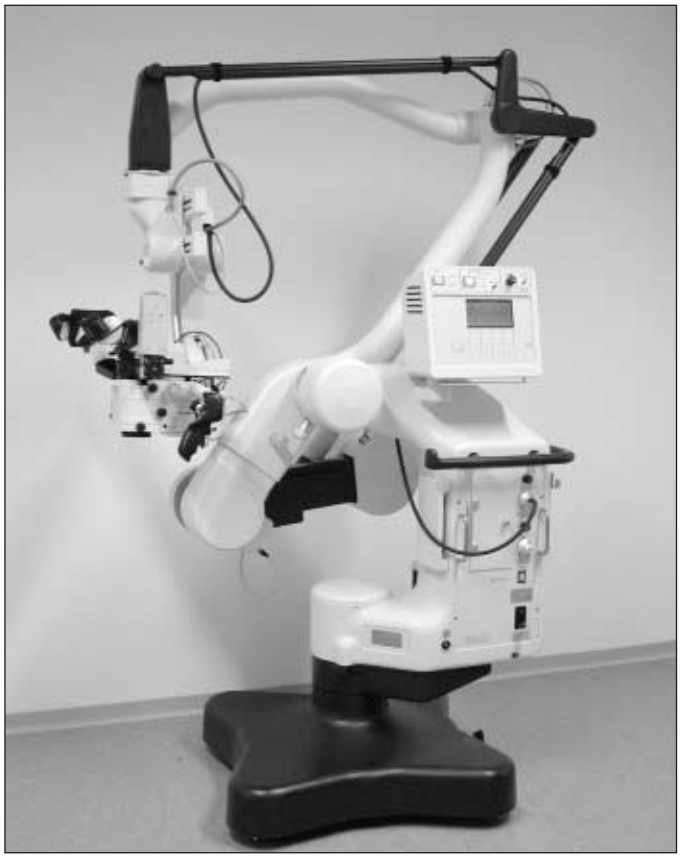
Transportation

Warning
Risk of injury by:
- **Uncontrolled swinging out of swing arm!**
- **Tilting of the stand!**
- **Feet in lightweight shoes can become trapped beneath the base!**

⇨When transporting the surgical microscope, always return it to the transport position.
⇨Always push the surgical microscope, never pull it.

Caution
Microscope can be damaged by uncontrolled tilting over!
⇨Hold the handgrips firmly before pressing the ALL-FREE button.

⇨Press the ALL-FREE button and bring the Leica M500 OH3 into the transport position (see figure below).



⇨Release footbrakes (see Page 14).
⇨Move Leica M500 OH3 via handgrip.

Preparations before surgery

Cleaning optical accessories
⇨Inspect the cleanliness of the eyepieces and objective as well as any photo or TV adapters as appropriate.
⇨Remove dust and dirt.

Mounting accessories

Warning
Mortal danger from electrical shock!
⇨Connect the Leica M500 OH3 surgical microscope to an earthed outlet only.

⇨Lock the Leica M500 OH3 (see Page 14).
⇨Connect power cable.
⇨Switch on power switch.
⇨Set footbrakes (see page 14).
⇨Outfit microscope with all accessories for use.
⇨Position hand/mouth switch.
⇨Position handgrips as needed for the forthcoming surgery.
⇨Screw off cover of connections (Item 13, Page 10), connect provided footswitch and check settings (see Page 25).

Balancing out microscope
⇨Balance out the Leica M500 OH3 (see Page 15).
⇨Release locks (see Page 14).

Setting up eyepieces
⇨Set eye-base and pupil-base (see Page 19).
⇨Set dioptre values for users (see Page 21).

Configuring control unit
⇨See the section entitled «Operation of the control unit», Page 22.
⇨Check settings of the handgrips (DIC function or XY movement) (see Page 26).
⇨Inspect all connections and make certain that all accessories are seated firmly.

Performing function checks

Illumination

Always allow the main and backup illuminators to remain lit for at least five minutes, otherwise the lighting capacity will be quickly reduced.

⇨Switch on main illuminator at the illumination unit (see Page 18).
⇨Switch to backup illuminator at the illumination unit (see Page 18).
⇨Switch illumination off again.

Footswitch
⇨Test all functions with the footswitch.

Handgrip
⇨Press the selection and ALL-FREE buttons and check movement.
⇨Set the movement speed of the X/Y axes with the regulating knob (Item 9, Page 10) if necessary.

TV camera/monitor and still-photo camera
(if present)
⇨Check the image on the TV monitor.
⇨Align TV and SLR camera to the microscopic image.
⇨For photographs: Insert daylight film.

Sterility
⇨Attach sterile components and sterile drapes (see Page 22).

Balancing out microscope
⇨Balance out the Leica M500 OH3 (see Page 15).
⇨Press the ALL-FREE button and check balancing.

Positioning at operating table

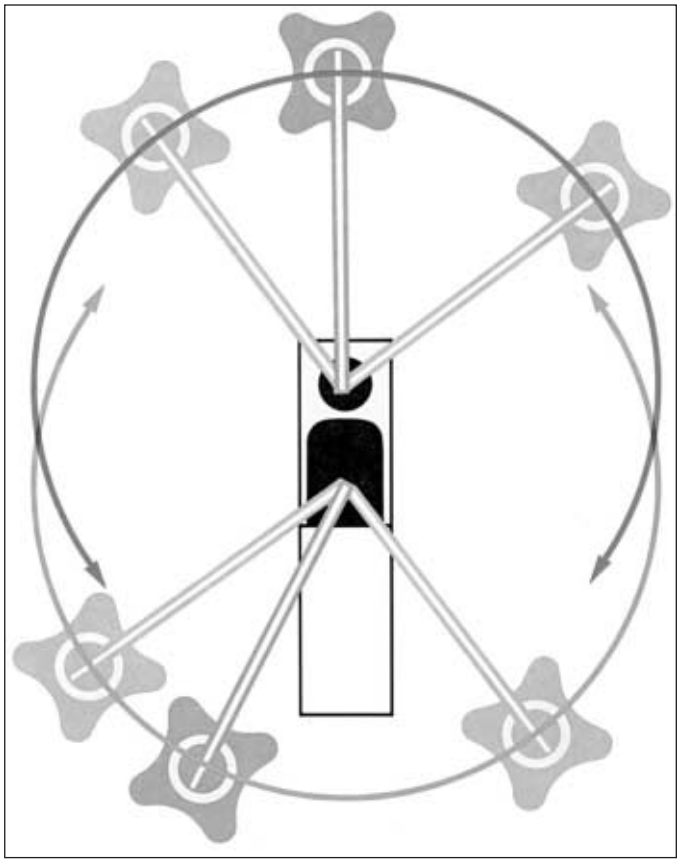
Warning
Risk of injury from tilting surgical microscope!
⇨Never change the accessories or attempt to rebalance the microscope while it is over the field of operation.
⇨Lock the Leica M500 OH3 each time before changing accessories.
⇨Balance out the Leica M500 OH3 each time after changing accessories.
⇨Do not release brakes in an unbalanced state.

Positioning the Leica M500 OH3 at the operating table is quite easy and offers a multitude of options, whether it be for surgery at the head, spinal column, etc.

This freedom to choose your position with the M500 OH3 is thanks to the extra-long and high swing arm.

⇨Release footbrakes (see Page 14).
⇨Carefully move the Leica M500 OH3 surgical microscope to the operating table and position it for the forthcoming surgery.

Positioning possibilities:



⇨Set footbrake.
⇨Position footswitch.
⇨Connect potential equalisation.

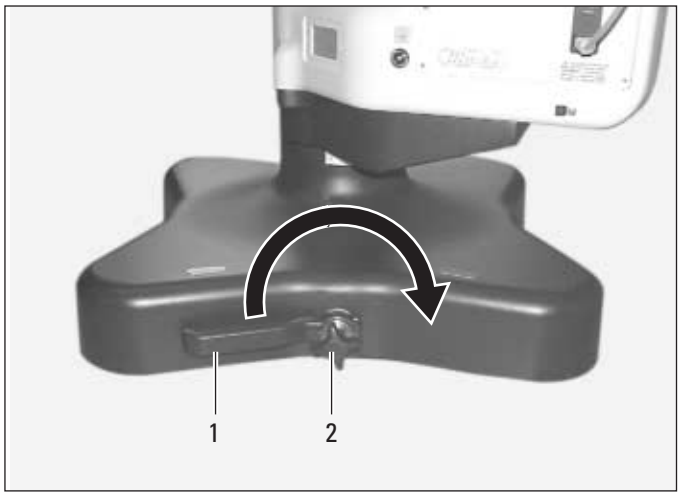
Tasks to be completed after surgery

⇨Swing microscope away.
⇨Move Leica M500 OH3 to the transport position and out of the operating area.
⇨Remove sterile components.
⇨Lock the Leica M500 OH3.
⇨Move the Leica M500 OH3 to the parked position.

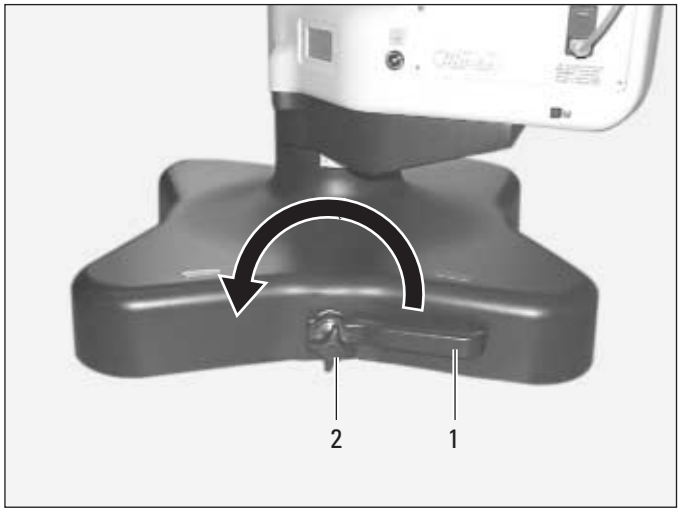
Setting/releasing footbrakes

Warning
Surgical microscope can move without warning!
⇨Always set footbrakes, except during transport.

Setting footbrakes
⇨Loosen star grip (2).
⇨Turn lever for footbrake (1) to the right.
⇨Tighten star grip again.



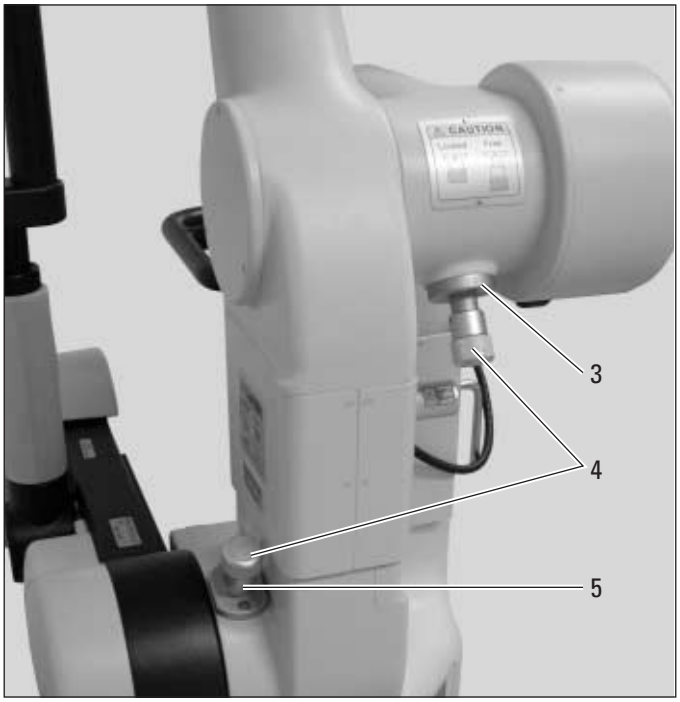
Releasing footbrakes
⇨Loosen star grip (2).
⇨Turn lever for footbrake (1) to the left.
⇨Tighten star grip again.



Locking the Leica M500 OH3

The D axis of the Leica M500 OH3 is locked when locking is performed.
Locking is mainly used for installation and accessory-change at the Leica M500 OH3.

⇨Pull out and turn locking knobs (4) until both points (arrows) are aligned.



⇨Move swing arm up and down until the lock (5) engages.
⇨Move swing arm forward and backward until the lock (3) engages.

Selecting XYZ-Free/Focus-Lock brakes

⇨Pull the selector switch (Item 10, Page 10) and tilt to the desired brake grouping (XYZ FREE or FOCUS LOCK).
⇨Press selector button (1) on handgrip.
The set movements can be made.

Balancing out the Leica M500 OH3

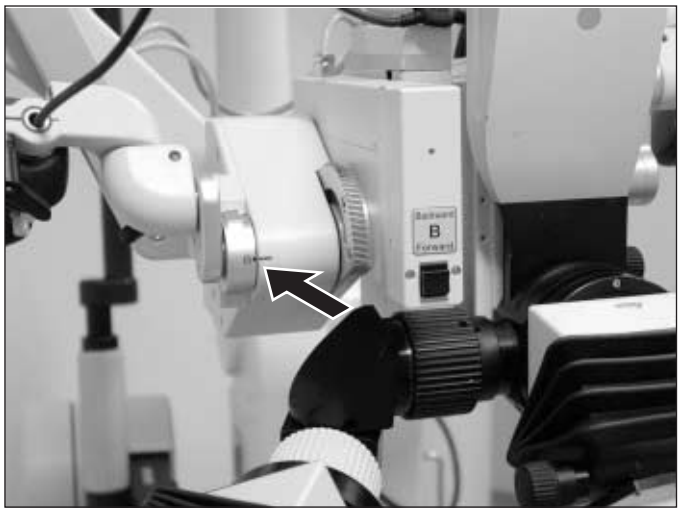
Warning
Risk of injury by movements of the microscope during balancing out.
⇨Do not remain in the immediate vicinity of the microscope during balancing out.

⇨Switch on the Leica M500 OH3.
⇨Mount accessories in the permissible weight range (see technical data on Page 43).

⇨Move the Leica M500 OH3 to the approximate working position.
⇨Press the ALL-FREE button and position the microscope carrier so that the line (2) points to A.

⇨Lift the protective flap and press the pushbutton (3) for auto balance.
The pushbutton flashes orange and an audible signal is emitted for the duration of the balancing procedure.

⇨When the audible signal stops, press the ALL-FREE button and swivel the microscope carrier into position B (arrow) until it engages.



If the mounted accessories (e.g. the tube) do not permit the 90° swivel movement, turn the tube upward, perform the swivel movement and then ensure that you turn the tube back to the working position.

⇨Lift the protective flap and press the pushbutton (Item 3, Page 15) again for auto balance.
The pushbutton flashes orange and an audible signal is emitted for the entire duration of the balancing procedure for the B, C and D axes.

Balancing is complete when the pushbutton for auto balance illuminates green and none of the three LEDs (Item 4, 5 or 6, Page 15) illuminates.
If one of the three LEDs illuminates, balancing must be checked:
⇨Press the ALL-FREE button and check balancing.
Correct balancing manually if necessary.

Correcting balancing manually

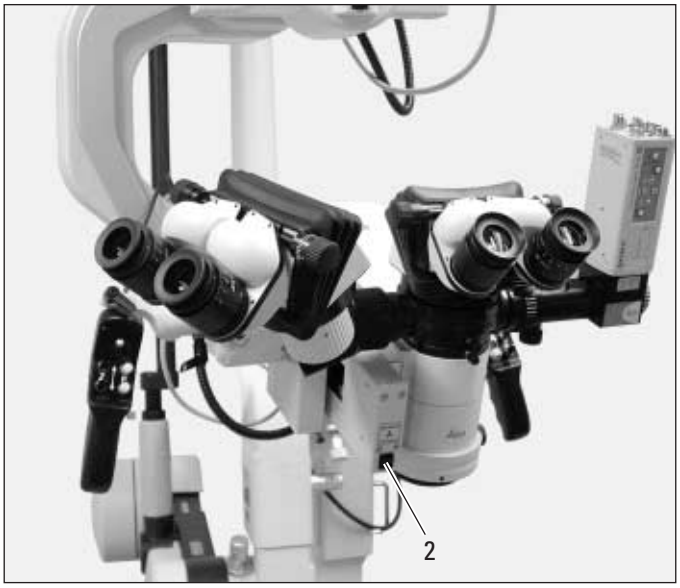
Ensure that no accessory parts collide with the microscope when balancing manually.

As the LEDs (Item 4, 5 and 6, Page 15) also show very slight balance deviations, the manual balance correction may only be performed for perceptible deviations.

⇨Press the ALL-FREE button.

The microscope tilts to the side:
⇨Press the C (1) button until the microscope is balanced out.

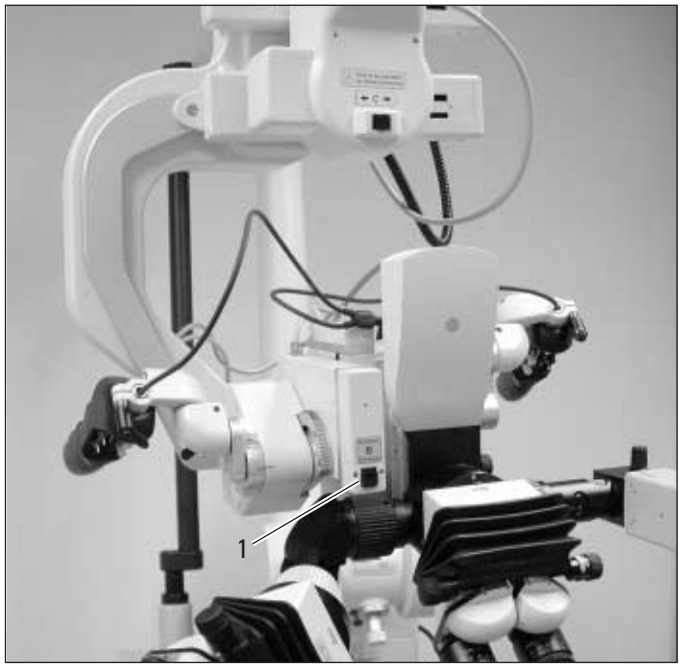
The microscope swivels to the front or back:
⇨Press the A (2) button until the microscope is balanced out.



⇨Press the ALL-FREE button and swivel the microscope carrier into position B until it engages.

If the mounted accessories (e.g. the tube) do not permit the 90° swivel movement, turn the tube upward, perform the swivel movement and then ensure that you turn the tube back to the working position.

⇨Press the B (1) button until the microscope is balanced out.



The microscope moves upward:
⇨Press the selector switch (2) to the left (–) until the microscope is balanced out.

The microscope moves downward:
⇨Press the selector switch (2) to the right (+) until the microscope is balanced out.

If the microscope cannot be balanced manually, the accessories are probably not in the balanceable weight range.
This can be solved for the A/B/C axes by decreasing/increasing the accessory weight in the acceptable range (8 kg–11.7 kg of accessories).
The D axis can be adapted by the number of wheel counterweights (see Page 30).

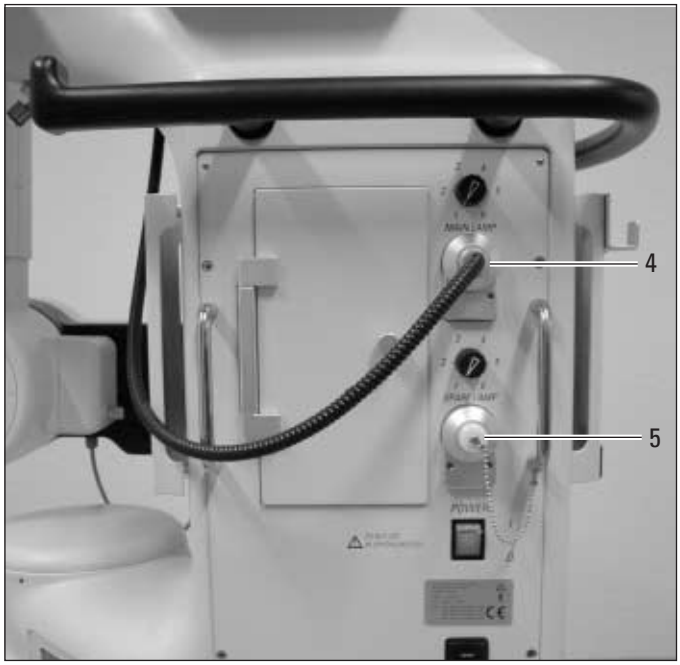
Switching on illumination

Always allow the main and backup illuminators to remain lit for at least five minutes, otherwise the lighting capacity will be quickly reduced.

⇨Press pushbutton (1) for illumination.
The illumination is activated, the pushbutton illuminates green and the LED (2) for the main illuminator or the LED (3) for the backup illuminator illuminates.

Switching from main illuminator to backup illuminator

⇨Unplug the fibre-optic light guide at connector (4) of the main illuminator.
The pushbutton (6) for illumination flashes orange and the LED (7) for the main illuminator goes out.



⇨Insert the fibre-optic light guide into the connector (5) of the backup illuminator and press the pushbutton (6) for illumination.
The pushbutton for illumination illuminates green and the LED for the backup illuminator (8) illuminates orange.

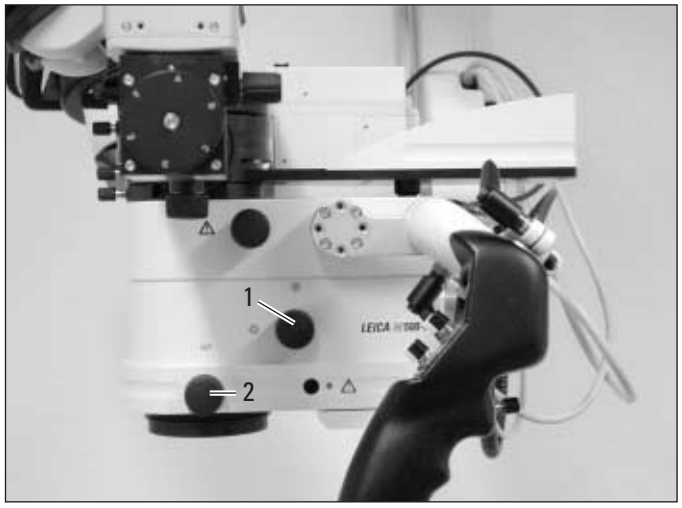
Replace defective illumination at the next opportunity and reinsert the fibre-optic light guide into the connector of the main illuminator again.

Setting light field diameter of illumination field and working distance

Warning
Severe damage to tissue can result from an incorrect working distance!
⇨When working with lasers, always set the working distance of the microscope to the laser distance and lock it there.

Warning
Severe injury to tissue can result from manual adjustment of the working distance!
⇨The rotary knob may not be adjusted for manual adjustment of the working distance while the laser is in use.

⇨Set the required working distance with the focus buttons on the handgrip/footswitch or, if a fault occurs, manually with the rotary knob (2).
⇨Set the desired light field diameter/brightness with the rotary knob (1).

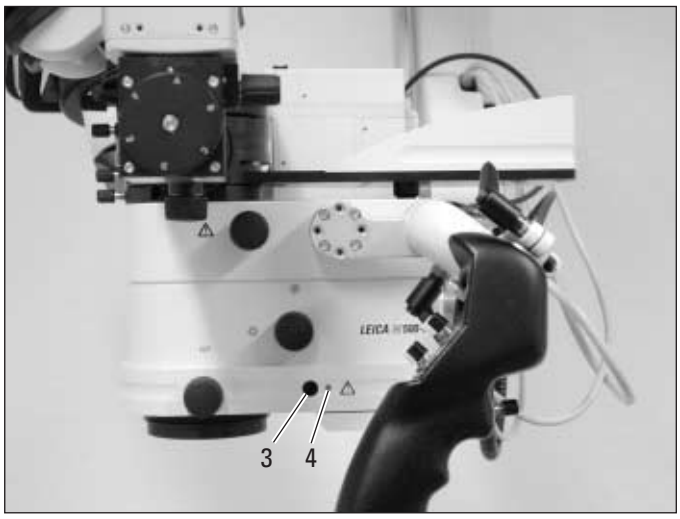


Lock/release multifocal focus

Locking the focus is necessary when using a fixed working distance or when working with a laser.

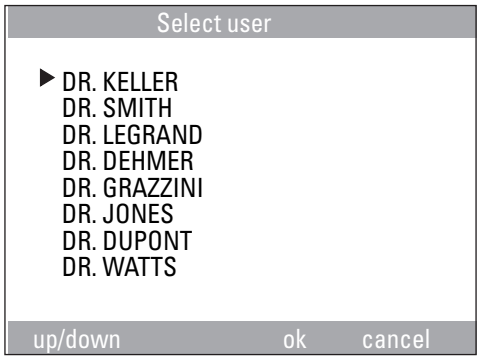
⇨Press button (3).
The yellow LED (4) illuminates and the focus is locked.

⇨Press button (3) again.
The yellow LED (4) goes out and the focus is released.

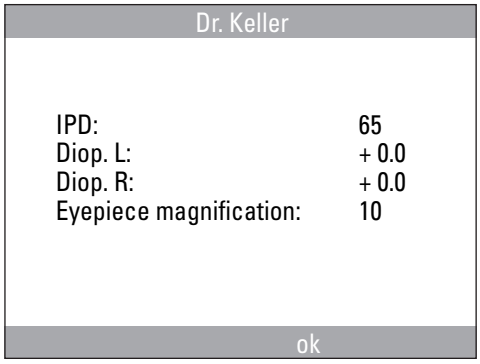


Selecting name of operating doctor at control unit

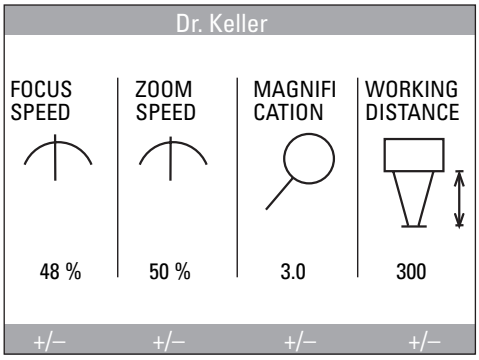
⇨Call up main menu 1 at the control unit with the display key.
⇨Select the entry «Change user» in main menu 1 with the arrow keys «up/down» and confirm with «ok».
⇨Select the name of the operating doctor with the arrow keys «up/down» and confirm with «ok».



The dioptre values, eye-base and eyepiece magnification of the selected doctor are shown in the display.



⇨Set values at the eyepiece/tube.
⇨Confirm with «ok» (for information on changing settings, see the chapter entitled «Changing eye-base, dioptre values and eyepiece magnification», Page 24).
The values for focus and zoom speed, magnification and working distance of the selected doctor are shown in the display.



⇨For changing the displayed values, see «Setting focus and zoom speed, magnification and working distance», Page 24.

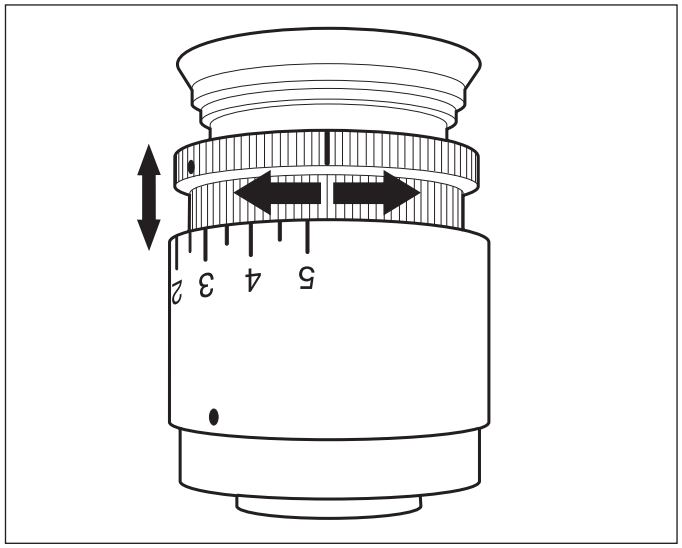
Determining dioptres for users

The individual dioptres can be regulated continuously from +5 to –5.
The treatment microscope ensures a high degree of fatigue resistance when the dioptre setting is correct for both eyes.

Preparations
⇨Open any double-iris diaphragm used.
⇨Turn both eyepieces to <0>.

Sharpening test object image:
⇨Select magnification 13.7.
⇨Place a flat test object with sharp contours under the eyepiece at the working distance.
⇨Move the microscope toward the test object via the camera or graticule until it appears sharp.

Setting dioptre
⇨Select the lowest magnification (magnification 6.4).
⇨Without looking into the eyepieces, turn both eye lenses to +5.



⇨Slowly turn the eyelenses toward –5 individually for each eye until the test object appears sharp.

Checking the setting
⇨Select the greatest magnification (magnification 13.7).
⇨Check sharpness and adjust if necessary.

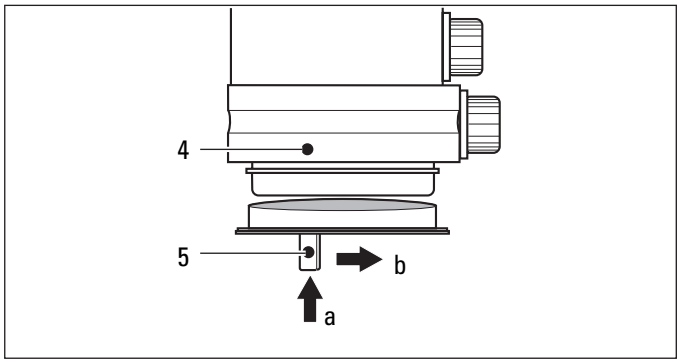
Setting up eyepieces

Setting dioptre values for users
The dioptrics are to be set exactly separately for both eyes; only then does the sharpness remain constant within the entire zoom range = parfocal.
⇨Read dioptre values of the operating doctor at the control unit (see Page 20).
⇨Set dioptre values at each eyepiece individually with the setting ring (2).

Setting eye-base and pupil-base
⇨Set eye-base with setting wheel (3).
⇨Set pupil-base with rotating ring (1).

Attaching protective glass to eyepiece

⇨Place the protective glass, which can be sterilised with gas, on the eyepiece so that the markings on the optics carrier (4) and on the protective glass (5) are aligned.



⇨Lead protective glass into the bayonet lock upward in direction (a).
⇨Turn protective glass in direction (b) until it engages.

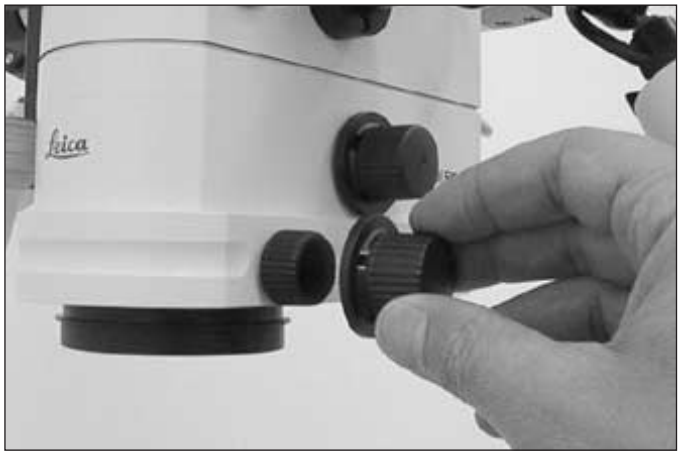
Attaching sterile operating elements

Rotary knobs of the Leica M500 OH3 surgical microscope can be provided with covers which can be sterilised.

Covers for rotary knobs

☞ Also attach the covers if you are using sterile disposable covers.
The operating elements are then easier to grip.

⇨Slide covers, which can be sterilised with steam, over the adjusting knob for the light field diameter and the adjusting knob for the working distance.



⇨Attach covers, which can be sterilised with steam, to accessories as well (if present).

Cover for footswitch

⚠ **Caution**
Risk of infection!
⇨Provide sufficient open space around the base to prevent the sterile cover being touched by non-sterile parts.

☞ Packing the footswitch in a plastic bag protects it being soiled.

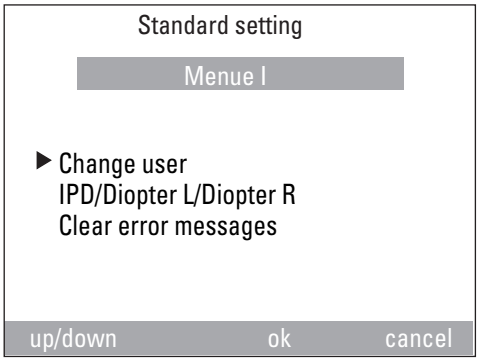
Sterile cover for base
⇨Switch on main illuminator.
⇨Press ALL-FREE button on handgrip and stretch out swing arm.
⇨Wear sterile gloves.
⇨Attach all sterile operating elements.
⇨Carefully unpack sterile cover and pull it over the microscope and swing arm.
⇨Secure protective glass at eyepiece.
⇨Do not fasten sterile cover with accompanying bands too tightly. It must still be possible to move the instrument easily. Check for easy ability to be moved.

Operation of control unit

Functions of control unit
- Save individual settings of the operating doctor
- Save current settings
- Set all motor functions continuously
- Display error messages

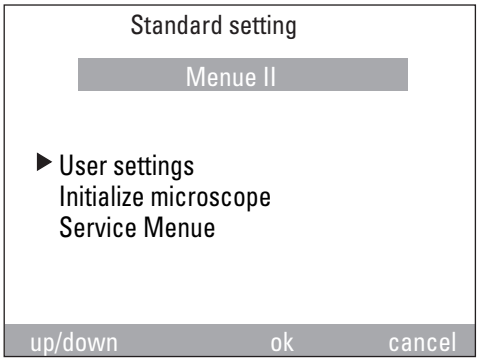
Calling up main menus
⇨Actuate main switch at basic tower.
The control unit is activated.
Zoom and multifocal are initialised.
⇨Call up the three main menus with the display key (Item 14, Page 10).

Functions in main menu 1



- Call up name of the operating doctor (see Page 20)
- Change eye-base, dioptre values and eyepiece magnification (see Page 24)
- Clear displayed error messages (see Page 24)

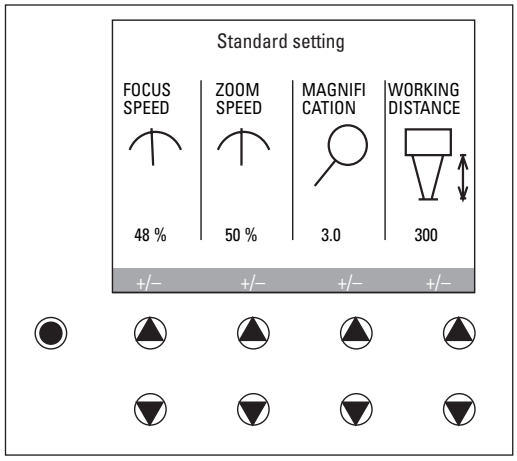
Functions in main menu 2



- Change standard setting (see Page 24)
- Initialise microscope (required if contact with the microscope was interrupted)
- Call up service menu

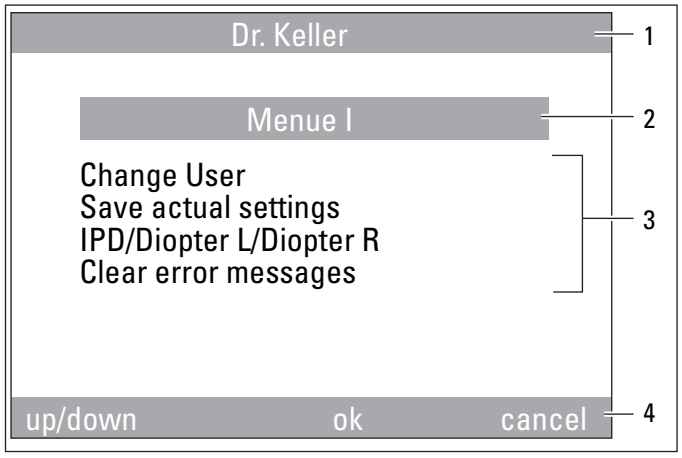
☞ Settings in the service menu may only be made by service technicians.

Functions in main menu 3



- Set focus and zoom speed, magnification and working distance (see Page 24)

Main menu interface



1 Title line
2 Status line
3 User area
4 Activity line

The control unit is always in the «standard setting» mode after switch-on. In this mode, the displayed values can only be checked, not changed. For information on changing standard settings, see Page 24.

The title line (1) of the display shows the name of the doctor whose settings were selected or «standard setting».
The status line (2) indicates the settings which are currently being edited at the control unit or the main menu which is currently active.
The user area (3) shows the selection options from which the user can choose. Exception: error messages and other information.
The activity line (4) shows the effect of the arrow keys located below.

Activity line	Effect
up/down	The pointer in the user area moves up or down when the arrow keys are pressed.
+/–	The selected value increases or decreases.
ok	The selection at which the pointer is currently located is called up.
save, ok/save	The entered value is saved.
cancel	Return to the previous menu field without saving.

Reactivating background lighting

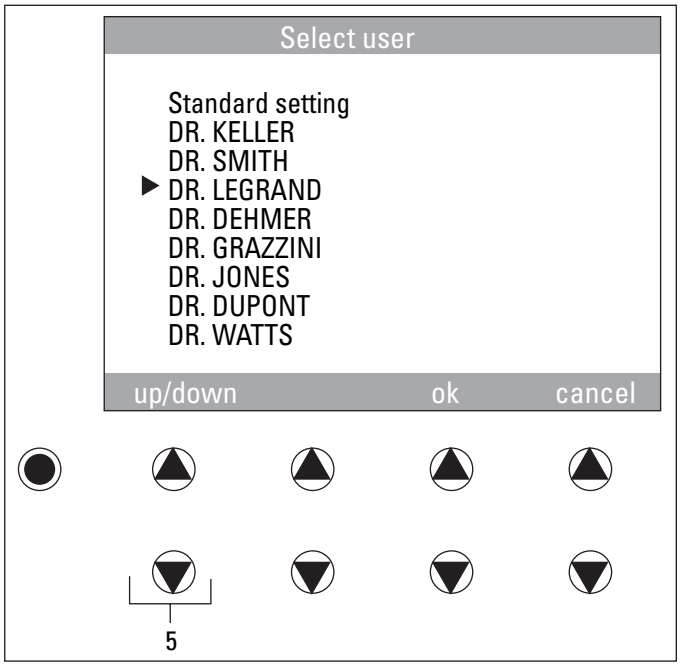
If nothing is entered at the control device for one minute, the display switches to low-power mode and the background lighting goes out.

⇨Press one of the arrow keys or the display key.

Settings at control unit

If a DI C500 module is used, please observe the user settings for the DI C500 at the control unit in the Leica DI C500/Leica ULT500 user manual/installation instructions.

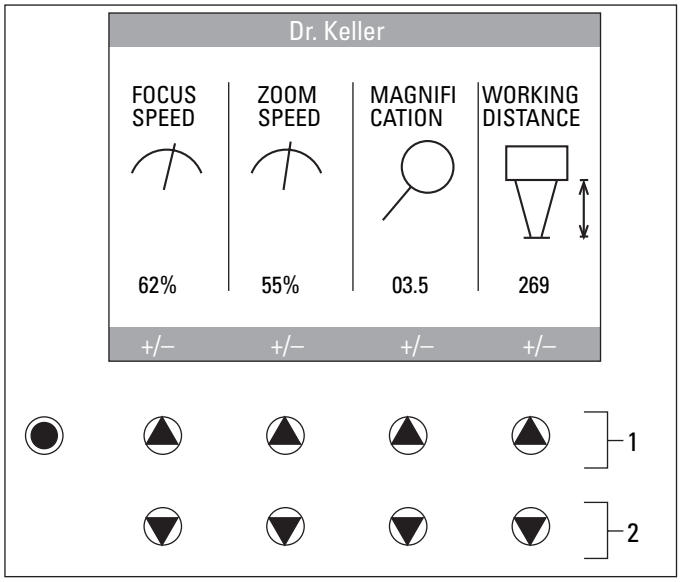
Calling up name of operating doctor



⇨Call up main menu 1 with the display key.
⇨Select «Change user» in main menu 1 with the arrow keys (5) and confirm with «ok».

⇨Select the name of the operating doctor with the arrow keys and confirm with «ok».
The dioptre values, eye-base and eyepiece magnification of the selected doctor are shown in the display.
⇨Check all values and confirm with «ok» (for information on changing settings, see «Changing eye-base, dioptre values and eyepiece magnification», Page 24).
The values for focus and zoom speed, magnification and working distance of the selected doctor are shown in the display.
The displayed values can be changed with the arrow keys and saved as well.

Setting focus and zoom speed, magnification and working distance



The following information is relative to a 10x eyepiece.
⇨Press the ▲ buttons (1).
The values for focus speed, zoom speed and magnification are increased and the value of the working distance increases.
⇨Press the ▼ buttons (2).
The values for focus speed, zoom speed and magnification are decreased and the value of the working distance decreases.

Setting ranges and measurement information

	Speed		Magnification	Working distance
	Focus	Zoom		
Measurement information	**%**	**%**	**factor**	**mm**
Limits	0	0	1.4	407
	100	100	13.7	207

Changing eye-base, dioptre values and eyepiece magnification
⇨Select «Eye-base and dioptre data» in main menu 1 with the arrow keys and confirm with «ok».
⇨Change the eye-base, left and right dioptre value and eyepiece magnification of the selected doctor with «+/-».
⇨When all values are entered, confirm with «Save».

Switching to settings of another doctor
⇨Select «Change user» in main menu 1 with the arrow keys and confirm with «ok».
A list of names appears for doctors who have saved settings at the microscope.
⇨Select the name of the doctor under «Select user» and confirm with «ok».
The settings of the selected doctor are active.

Changing standard setting
The Leica M500 OH3 surgical microscope is supplied from the factory with the standard setting, which can be changed as desired.

☞ If you have changed the standard setting and would like to restore the factory setting, you can load it from the service menu. Only a service technician can make this setting.

⇨Select «Change user» in main menu 1 with the arrow keys and confirm with «ok».
⇨Select «Standard setting» under «Select user» and confirm with «ok».
The standard settings can now be changed.

Clearing error messages
If a fault occurs in the Leica M500 OH3, an error message appears on the display.
⇨Eliminate fault (see the chapter entitled «What to do if...», Page 40).
⇨Go to «Clear error messages» in main menu 1 and confirm with «ok».
The error message is cleared from the display.

Selecting footswitch type
Four different footswitches are available.
⇨Go to «User settings» in main menu 2 and confirm with «ok».
⇨Determine which connector (1 or 2) at the control unit is used to connect the footswitch.
⇨Select «Foot/handswitch connector 1» or «Foot/handswitch connector 2» under «User settings» and confirm with «ok».
⇨Select «Set foot/handswitch type» under «Function» and confirm with «ok».
⇨Select the desired type under «Foot/handswitch type» and confirm with «Save».

Changing settings for footswitch 1/2

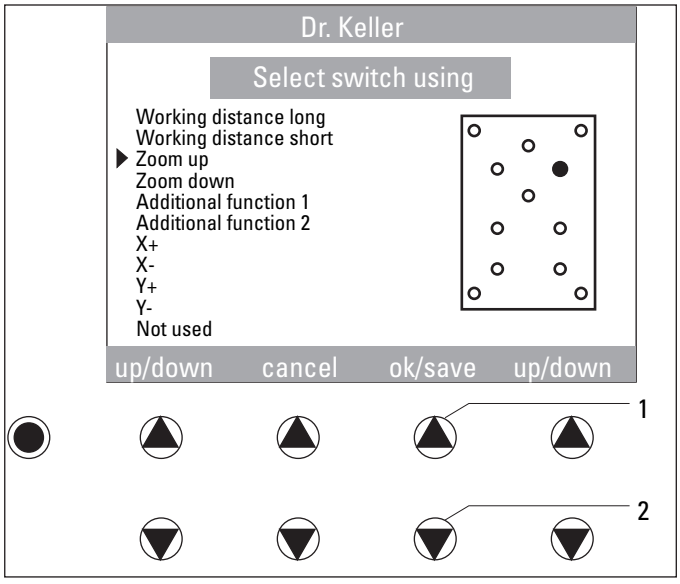
Always pay attention to the title line. It displays the name of the doctor who just saved the settings which were called up. This is to prevent the settings of other doctors from being changed or deleted.

⇨Go to «Change user» in main menu 1 and confirm with «ok». A list of names appears for doctors who have saved settings at the microscope.
⇨Select the name of the doctor under «Select user» and confirm with «ok».
The settings of the selected doctor are active and the eyebase, dioptre numbers and eyepiece magnification entered by the doctor appear in the display.
⇨Continue with «ok».
⇨Select «User settings» in main menu 2 and confirm with «ok».
⇨Select «Foot/handswitch connector 1» or «Foot/handswitch connector 2» under «User settings» and confirm with «ok».

User configuration:

There are two footswitch configuration variants: «Standard configuration» and «User configuration». With the «standard configuration», certain configurations of the keys and pedals are suggested and can be saved. With the «User configuration» variant, the pedals can be configured as desired.

⇨Select «User configuration footswitch» under «Function» and confirm with «ok».
⇨Select the desired pedal (❍ becomes ●) under «Select switch» with the right arrow keys under «up/down» in the sketch in the display.
⇨Select the desired function with the left arrow key under «up/down» (e.g. «focus up»).
⇨Confirm with «ok», i.e. upper arrow key (1), and select the next pedal.



⇨When all functions have been selected and confirmed with «ok», save the setting with «Save», i.e. lower arrow key (2). The configuration is now saved for the selected doctor.

From a user configuration back to the standard configuration:
⇨Select the «Standard configuration foot/handswitch» under «Function» and confirm with «ok».
⇨Accept the recommended configuration with «Save».
The standard configuration of the selected function is displayed in the sketch (❍ becomes ●).

Performing function check on footswitch

A function test can be performed to check the configuration of the footswitch.
⇨Select «User settings» in main menu 2 and confirm with «ok».
⇨Select «Foot/handswitch connector 1» or «Foot/handswitch connector 2» under «User settings».
⇨Select «Control foot/handswitch functions» under «Function» and confirm with «ok».
⇨Press any button on the footswitch.
The set function with an arrow symbol ► is displayed to the left and the ❍ symbol in the symbol picture on the right changes to ●.

Setting focus and zoom speed, focus and zoom position and eyepiece magnification

☞ Always pay attention to the title line. It displays the name of the doctor who just saved the settings which were called up. This is to prevent the settings of other doctors from being changed or deleted.

⇨Select «User settings» in main menu 2 and confirm with «ok».
⇨Select «Microscope» under «User settings» and confirm with «ok».
⇨Select either «Focus speed and position», «Zoom speed and position» or «Eyepiece magnification» under «Function» and confirm with «ok».
⇨Set the desired value with «+/–» and accept with «Save».

Changing contrast and brightness of control device display

⇨Go to «Change user» in main menu 1 and confirm with «ok». A list of names appears for doctors who have saved settings at the microscope.
⇨Select the name of the doctor under «Select user» and confirm with «ok».
The settings of the selected doctor are active and the dioptre values, eye-base and eyepiece magnification of the selected doctor are shown in the display.
⇨Continue with «ok».
⇨Select «User settings» in main menu 2 and confirm with «ok».
⇨Select «Control unit» under «User settings» and confirm with «ok».
⇨Select «Screen contrast/illumination» under «Function» and confirm with «ok».
⇨Select «Screen contrast» or «Background illumination» with the arrow keys, set the desired value with «+/–» and confirm with «Save».

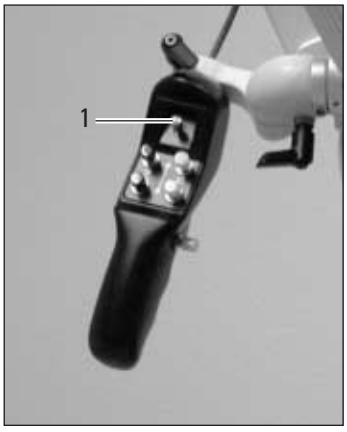
Entering or changing user name

⇨Go to «Change user» in main menu 1 and confirm with «ok». A list of names appears for doctors who have saved settings at the microscope.
⇨Select the name of the doctor under «Select user» and confirm with «ok».
The settings of the selected doctor are active and the dioptre values, eye-base and eyepiece magnification of the selected doctor are shown in the display.
⇨Continue with «ok».
⇨Select «User settings» in main menu 2 and confirm with «ok».
⇨Select «Control unit» under «User settings» and confirm with «ok».
⇨Select «User name» under «Functions» and confirm with «ok».
⇨Place the flashing cursor under the desired code with <–/–>.
⇨Select the code to be set in the code table with «Code +/–» (code has black background) and set it with «Set/ins».
The code is inserted into the line and the cursor jumps to the next free position.
⇨Search for and insert next code.

If the user name is entered:
⇨Select «Done/del».
«Save, continue or cancel» appears on the status line.
⇨Select the desired function with the arrow keys.

Changing settings for handgrips (joystick and brakes)

The joystick (1) can be configured for the XY movement of the microscope or for menu control when using a DI C500.
Setting configuration of joystick:



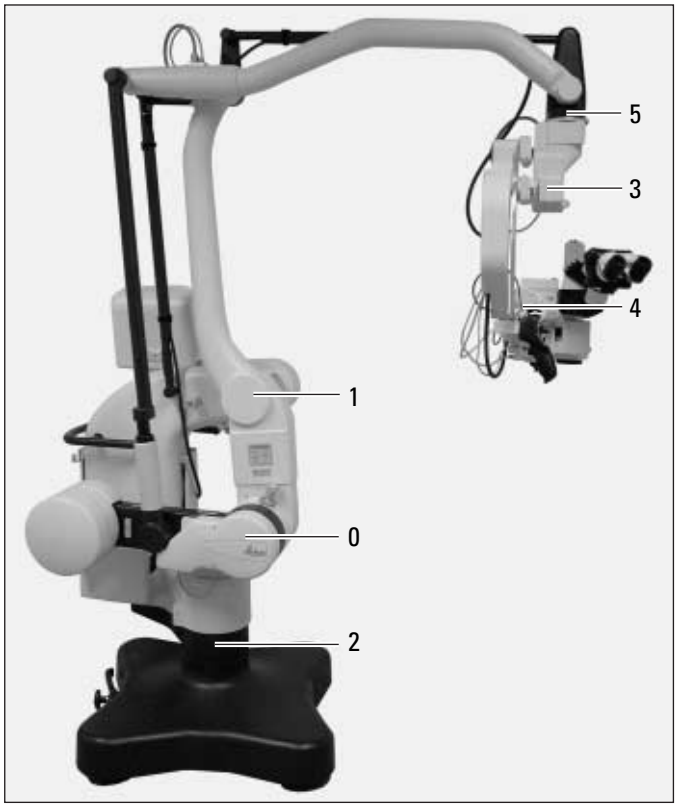
⇨Go to «User settings» in main menu 2 and confirm with «ok».
⇨Select «Left handgrip» or «Right handgrip» under «User settings» and confirm with «ok».
⇨Select «X/Y» or «DIC» under «Right handgrip» / «Left handgrip» and confirm with «Save».

Setting brake combination:

Three of the six brakes of the Leica M500 OH3 surgical microscope can be released in combination at the selector button (1).

Brake No.	Position
0	Up/down in parallelogram
1	Forward/backward in parallelogram
2	At base
3	In C sledge of microscope carrier
4	At A/B sledges of the surgical microscope
5	In rotatable joint

- Brake Nos. 0, 1 and 2 for moving the stand (XYZ FREE)
- Brake Nos. 3, 4 and 5 for moving the Leica M500 N (FOCUS LOCK) surgical microscope

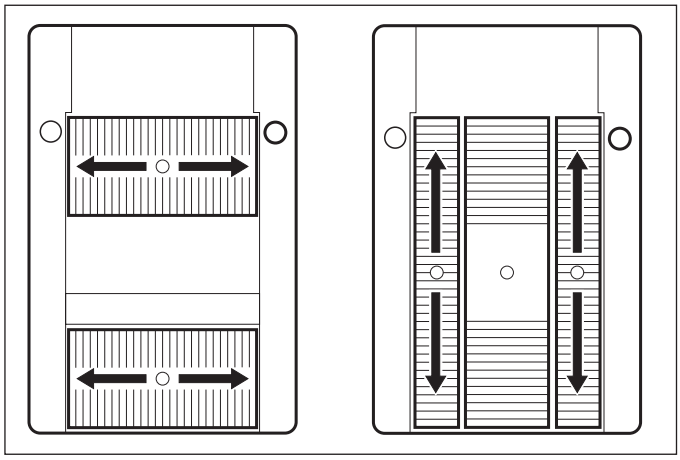


Controlling zoom and focus

Warning
Severe damage to tissue can result from an incorrect working distance!
⇨When working with lasers, always set the working distance of the microscope to the laser distance.

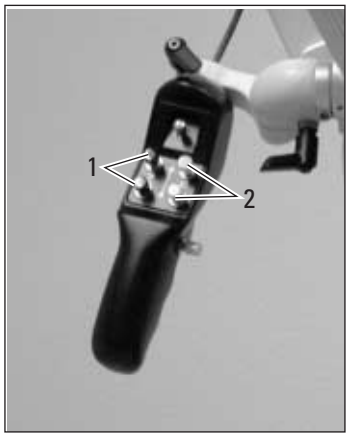
If the zoom or focus motor fails, the zoom or focus can be set manually.

With footswitch



⇨Control zoom and focus by pressing on the pedals.
The pedals are moved crosswise or lengthwise.
The configuration of the buttons and pedals can be selected individually (see the section entitled «Changing settings for footswitch 1/2», Page 25).

With handgrips



Zoom (1)
– Upper button: magnify
– Lower button: reduce

Focus (2)
– Upper button:
increase working distance
– Lower button:
decrease working distance

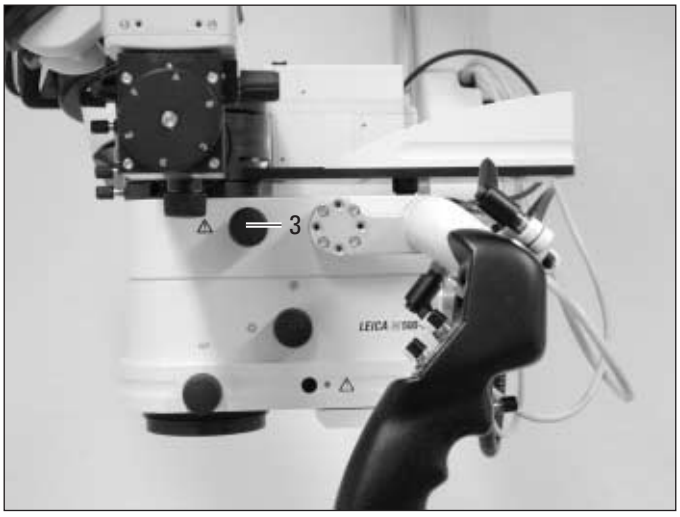
Setting zoom and focus speed

The zoom and focus speed is set at the control unit (see the section entitled «Setting focus and zoom speed, magnification and working distance», Page 24).

Setting zoom manually

Caution
Zoom motor can be permanently damaged!
⇨Only adjust the zoom manually if the zoom motor is defective.

If the zoom motor fails, zooming can be set manually with the rotary knob (3).

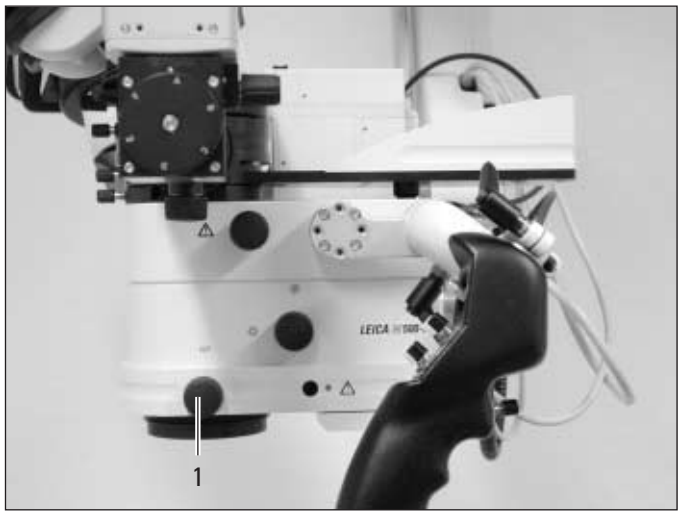


⇨Press rotary knob (3).
⇨Set desired zoom by rotating it.

Adjusting focus manually

Warning
Severe injury to tissue can result from manual adjustment of the working distance!
⇨The rotary knob may not be adjusted for manual adjustment of the working distance while the laser is in use.

If the focus motor fails, focusing can be set manually with the rotary knob (1).

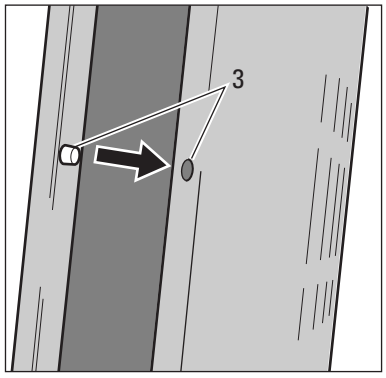


⇨Set the required focus with the rotary knob (1).

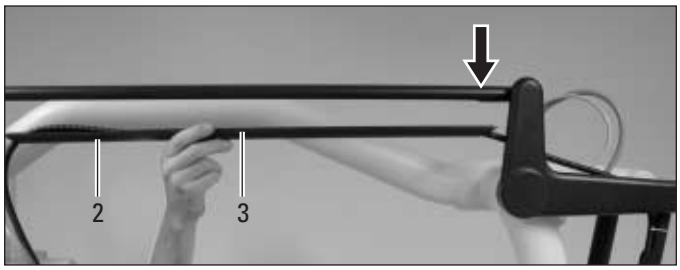
Pulling in additional cables

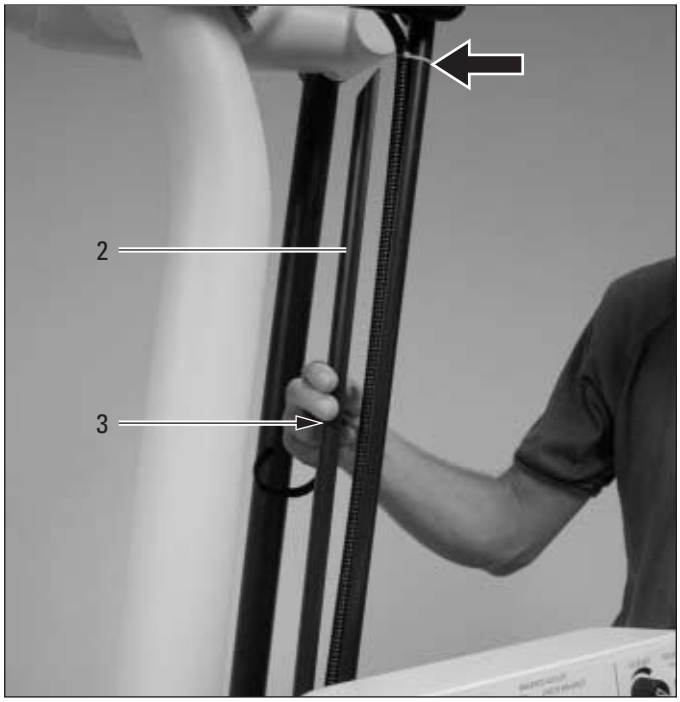
Additional cables can be pulled through the available cable channels of the Leica M500 OH3 for use with accessories (e.g. video, DI C500).

Positioning aids (3) are located at the cable channels (2) and must engage in the counter piece of the cable channel during installation.



⇨Loosen cable channels (2) and pull cables in.
⇨Secure cables in stretched position of the stand using cable ties (see arrows).





⇨Close cable channels again.

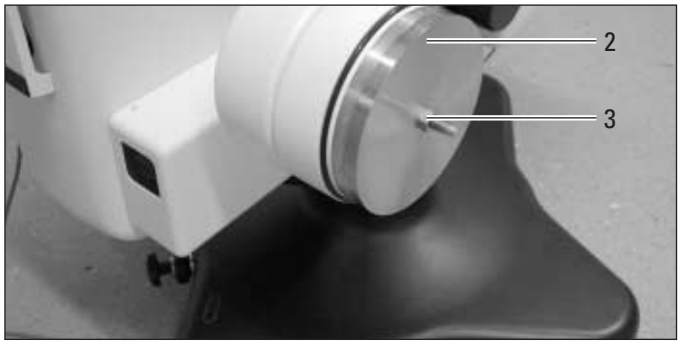
Changing wheel counterweight at D axis

If the Leica M500 OH3 cannot balance out the hardware used, a wheel counterweight must be added or removed.
This is also signalled by the LED (Item 5, Page 10) for balancing the D axis.

Caution
Risk of injury by falling wheel counterweight or cover!
⇨During the change, ensure that your feet are not under the wheel counterweight or the cover.

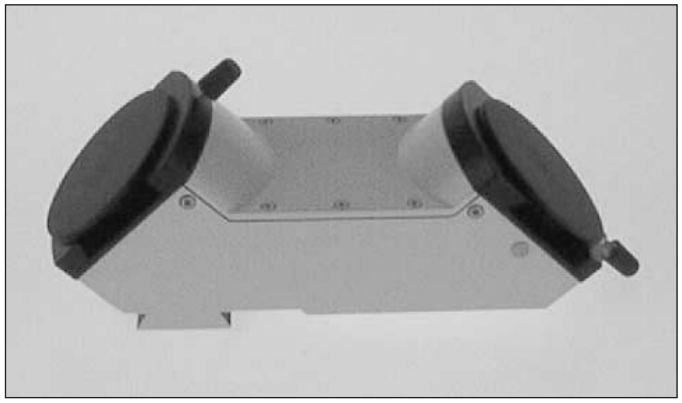
⇨Lock the Leica M500 OH3 (see Page 14).
⇨Turn down cover (1) of axis.

⇨Screw off hex nut (3).



⇨Add or remove wheel (2).
⇨Screw on hex nut (3).
⇨Screw cover (1) back on.

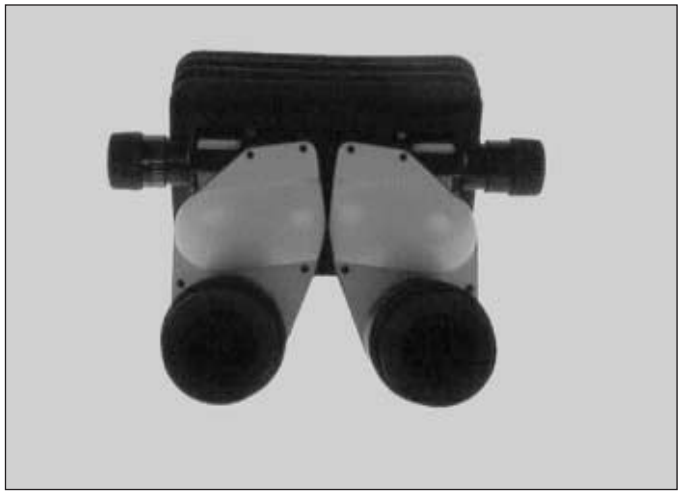
180° dual stereo attachment



- allows a second person to view
- attached to the optics carrier

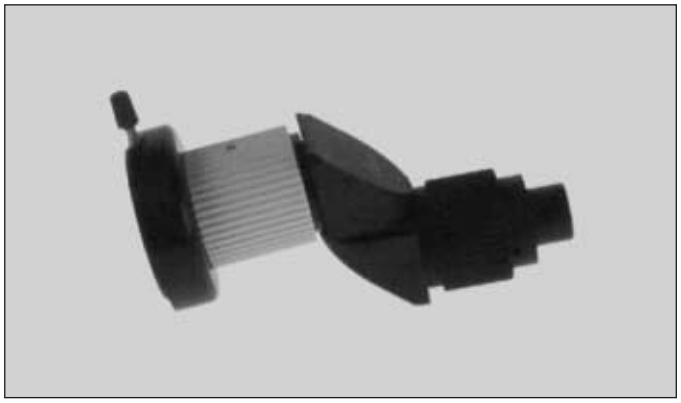
The following can be attached to the 180° dual stereo attachment:
- binocular tube, can be tilted 30°–150°
- beam splitter
- 30° rotating ring
- additional binocular tubes
  Light distribution: 50 % on each side

Binocular tube; can be tilted; with variable viewing angles 30°–150°



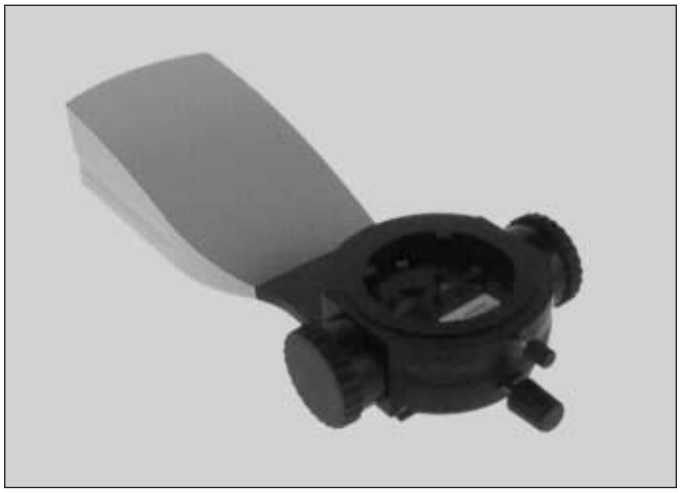
- with pupil-base adjustment for the eye-base
- focal length f = 170 mm
- integrated eyepieces with dioptre adjustment and built-in eyecup adjustment

Stereo/second-observer attachment



- attached to beam splitter

Beam splitter with counterweight

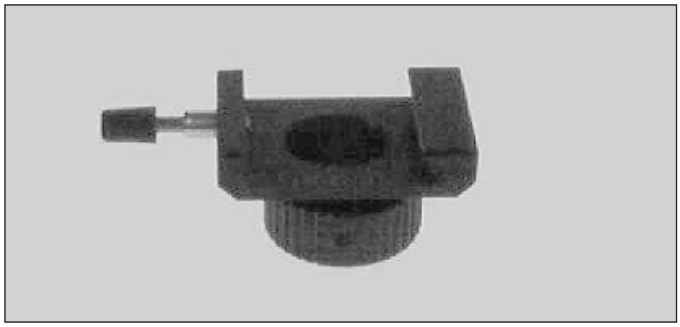


- allows viewing by a second person or documentation
  Light distribution: 50 % on each side

Video-zoom tube

- attached to beam splitter

Adapter piece for accessories of the M 600 series

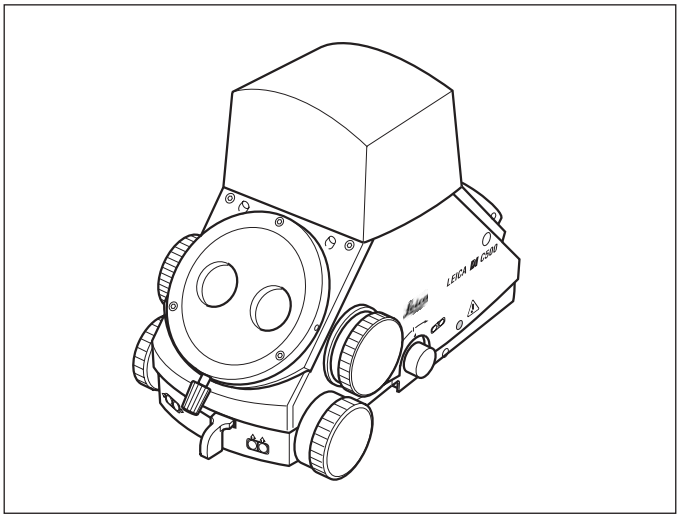


- attached to beam splitter of M 500-N surgical microscope

Beam splitter

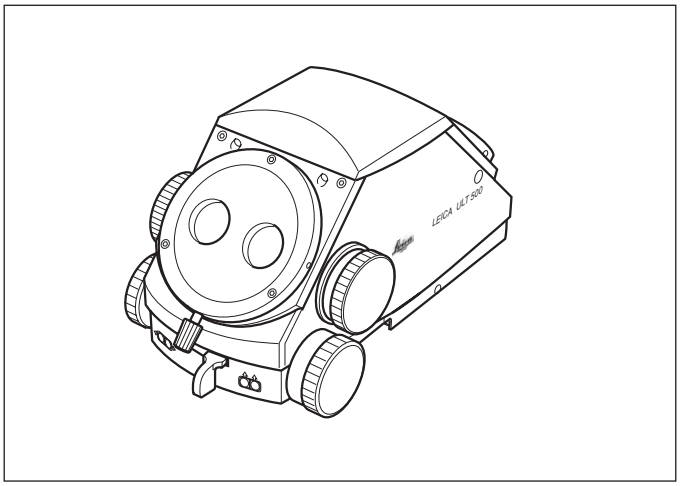
- allows viewing by a second person or documentation
  Light distribution: 50 % on each side

Dual Imaging Color Module DI C500



- beam splitter with eight optical outputs
- built-in colour display superimposes data or video images

Ultra Observer ULT500



- beam splitter with eight optical outputs

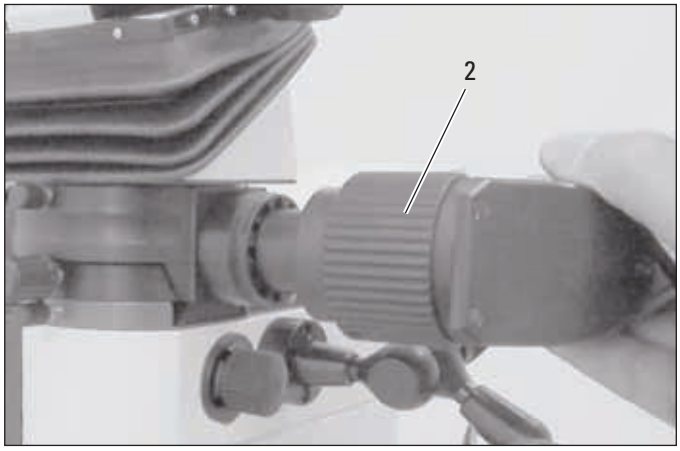
Mounting accessories

Warning
Risk of injury from tilting surgical microscope!
- ⇨Never change the accessories or attempt to rebalance the microscope while it is over the field of operation.
- ⇨Lock the Leica M500 OH3 each time before changing accessories.
- ⇨Balance out the Leica M500 OH3 each time after changing accessories.
- ⇨Do not release brakes in an unbalanced state.

Mounting 90° stereo attachment, binocular tube and beam splitter

⇨Loosen clamping screw (1).
⇨Place accessory into the dovetail ring from above.
⇨Tighten clamping screw (1).

Mounting stereo second-observer attachment and video-zoom tube



⇨Insert accessory and check whether the connection is engaged.
⇨Tighten locknut (2) by hand.

The Leica surgical microscope is a state-of-the-art system. Nevertheless, hazards may still arise during operation.
⇨For this reason, you must always follow the directions given in this user manual and particularly the safety precautions.

Intended use of instrument

- The Leica surgical microscope system is an optical instrument which uses magnification and illumination to improve the display of objects. It can be used for observation, documentation as well as in human and veterinary surgery.
- The Leica surgical microscope is only to be used on a strong floor in a closed room.

Directions for the person responsible for the instrument

⇨Ensure that the surgical microscope is used only by qualified personnel.
⇨Ensure that this user manual is always available at the place where the surgical microscope is used.
⇨Carry out regular inspections to make sure the user is complying with safety requirements.
⇨Brief the user thoroughly and explain the meaning of the hazard signs and safety instructions.
⇨Allocate responsibilities for getting the instrument ready for work, for operating it and for maintaining it. Monitor compliance with this.
⇨Do not use the surgical microscope system unless it is in proper condition.
⇨If any faults develop which might put the safety of people at risk, immediately contact your Leica representative or Leica Microsystems (Switzerland) Ltd., BU SOM, 9435 Heerbrugg, Switzerland.
⇨If you use accessories from other manufacturers with the Leica surgical microscope, ensure that the manufacturer confirms that the combination is safe to use, and observe the user manual.
⇨Modifications and maintenance work may only be performed by professionals expressly authorised by Leica.
⇨When commencing maintenance work, only original Leica parts are to be used.
⇨After maintenance or technical modifications, the device must be readjusted in accordance with our technical specifications.
⇨If the device is modified or maintenance has been performed by unauthorised personnel, if the equipment is improperly maintained (providing the maintenance was not performed by us) or if the device has been operated improperly, Leica is relieved of all liability.
⇨The effect of the surgical microscope on other instruments has been tested as specified in EN 60 601-1-2. The system has passed the tests relating to emissions and immunity. Comply with the usual precautionary and safety measures relating to electromagnetic and other forms of radiation.

Directions for the user

⇨Follow the instructions given in this manual.
⇨Follow the instructions given by your employer regarding the organisation of work and safety at work.

Dangers of use

Warning
Risk of injury by:
- **Uncontrolled swinging out of swing arm!**
- **Tilting of the stand!**
- **Feet in lightweight shoes can become trapped beneath the base!**

⇨When transporting the surgical microscope, always return it to the transport position.
⇨Always push the surgical microscope; never pull it.

Caution
Microscope can be damaged by uncontrolled tilting over!
⇨Hold the handgrips firmly before pressing the ALL-FREE button.

Warning
Mortal danger from electrical shock!
⇨Connect the Leica M500 OH3 surgical microscope to an earthed outlet only.

Warning
Risk of injury from tilting surgical microscope!
⇨Never change the accessories or attempt to rebalance the microscope while it is over the field of operation.
⇨Lock the Leica M500 OH3 each time before changing accessories.
⇨Balance out the Leica M500 OH3 each time after changing accessories.
⇨Do not release brakes in an unbalanced state.

Warning
Surgical microscope can move without warning!
⇨Always set footbrakes, except during transport.

Warning
Risk of injury by movements of the microscope during balancing out.
⇨Do not remain in the immediate vicinity of the microscope during balancing out.

Warning
Severe damage to tissue can result from an incorrect working distance!
⇨When working with lasers, always set the working distance of the microscope to the laser distance and lock it there.

Warning
Severe injury to tissue can result from manual adjustment of the working distance!
⇨The rotary knob may not be adjusted for manual adjustment of the working distance while the laser is in use.

Caution
Risk of infection!
⇨Provide sufficient open space around the base to prevent the sterile cover being touched by non-sterile parts.

Caution
Zoom motor can be permanently damaged!
⇨Only adjust the zoom manually if the zoom motor is defective.

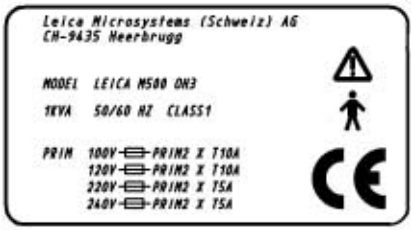
Caution
Risk of injury by falling wheel counterweight or cover!
⇨During the change, ensure that your feet are not under the wheel counterweight or the cover.

Caution
Risk of burns!
The lamp insert gets very hot.
⇨Check that the lamp insert has cooled before you remove the lamp.

Labelling

1

3



5

Grounding reliability can only by achieved when EQUIPMENT is connected to equivalent recentable marked "Hospital only" or "Hosptial Grade".

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2

DO NOT USE IN OPHTALMOLOGY

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S/N TTMMJJxxx
Made in JP

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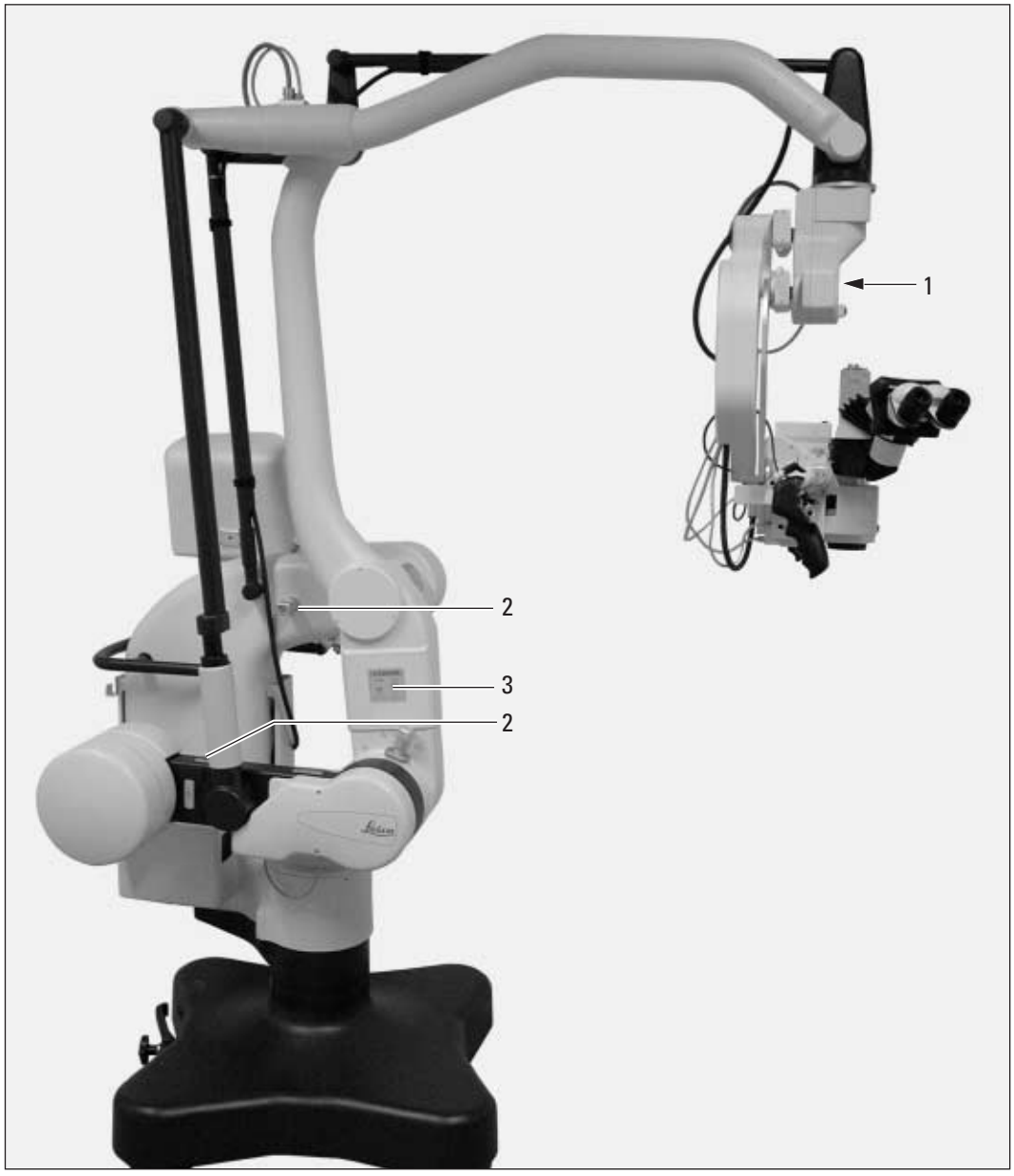


1 Only to be operated by trained personnel

2 Danger of squeezing fingers

3

Care instructions

- Put a dust cover over the instrument during breaks in work.
- Keep accessories in a dust-free place when not in use.
- Remove dust with a pneumatic rubber pump and a soft brush.
- Clean the objectives and eyepieces with special optics cleaning cloths and pure alcohol.
- Protect the surgical microscope from damp, vapours, acids, alkalis, and corrosive substances.
  Do not store chemicals near the instrument.
- Protect the surgical microscope from improper use.
  The mounting of different plugs and the dismantling of optical systems and mechanical components may only be carried out if explicitly required by the instructions.
- Protect the surgical microscope from oil and grease.
  Never oil or grease mechanical parts or sliding surfaces.
- Remove coarse debris with a moistened disposable cloth.
- For disinfecting the surgical microscope, use compounds from the surface disinfecting group on the basis of the following active ingredients:
  - aldehyde,
  - alcohol,
  - quaternary ammonia compounds.

☞ Due to possible damage of the materials, compounds containing the following are not appropriate
- halogen-separated compounds,
- strong organic acids,
- oxygen-separated compounds.

☞ Observe the directions of the manufacturer of the disinfectant.

☞ It is advisable to enter a service agreement with Leica Service.

To retain the reliability of the surgical microscope, we recommend inspecting the product annually covering our detailed checklist.
Please contact your Leica Service representative.

Replacing lamps

⇨Open access hatch (1) for lamp inserts.
The pushbutton for illumination (Item 6, Page 18) flashes orange.

⚠ **Caution**
Risk of burns!
The lamp insert gets very hot.
⇨Check that the lamp insert has cooled before you remove the lamp.

⇨Pull out defective lamp insert (2 or 4) and insert new lamp insert (spare part No. 10 448 022).

☞ When inserting the lamp insert, ensure that the arrow (3) points to the right.

⇨Close access hatch again.
The pushbutton for illumination (Item 6, Page 18) goes out.

Replacing fuses

220 V–240 V range: two 5-A fuses, slow blow
100 V–110 V range: two 10-A fuses, slow blow

⇨Remove cover (1) with screwdriver.

⇨Remove fuses (2) from the fasteners and replace them.

Operational check

Illumination

Always allow the main and backup illuminators to remain lit for at least five minutes, otherwise the lighting capacity will be quickly reduced.

⇨Switch on the power switch.
⇨Check main illuminator and backup illuminator.
⇨Switch back to main illuminator and switch off illumination.

Footswitch

⇨Position footswitch.
⇨Test all functions with the footswitch.

General faults

If the device no longer functions properly,
please contact your Leica representative for advice.

Fault	Cause	Remedy
The microscope tilts when the ALL-FREE button is pressed.	The microscope carrier is not balanced properly.	⇨Balance out microscope carrier (see Page 15).
The microscope cannot be moved, or great force is required to move it.	A cable is clamped.	⇨Re-lay the affected cable.
	The Leica M500 OH3 is locked.	⇨Release lock (see Page 14).
The functions cannot be actuated with footswitches or the controller at the handgrips.	A cable connection has come loose.	⇨Check the power cable. ⇨Check footswitch connection.
	Assignment entered incorrectly at the control unit.	⇨Change the assignment by means of the control unit.
No light in microscope.	The fibre-optic light guide has detached.	⇨Check connection of fibre-optic light guide.
	Main and/or backup illuminator defective.	⇨Switch to other illumination (see Page 18).
The image does not remain sharp.	Eyepieces not properly seated.	⇨Screw eyepieces down completely.
	Dioptrics not set correctly.	⇨Perform dioptre correction exactly according to the instructions (see Page 21).
The microscope or swing arm moves up and down or rotates on its own.	Swing arm not balanced out correctly.	⇨Balance out the Leica M500 OH3 (see Page 15).
	Cables not laid properly or have moved and are putting a strain on the system (possibly an additional video cable).	⇨Lay cables according to installation instructions and relieve tension.
	Leica M500 OH3 was balanced out while locked.	⇨Release locks (see Page 14) and balance out Leica M500 OH3 (see Page 15).
Microscope and microscope carrier can only be moved with great force or not at all.	Automatic balancing was not completed.	⇨Ensure that position B was reached (Page 15/16). ⇨Press the pushbutton for auto balance again.

Fault	Cause	Remedy
Automatic balancing cannot be performed.	Microscope tilted too severely.	⇨Align A/B axes parallel at microscope (see Page 15). ⇨Perform automatic balancing again.
	Protective flap at pushbutton for auto balance was not flipped up before pressing.	⇨Flip up protective flap and press pushbutton for auto balance.
Zoom cannot be adjusted electrically.	Failure of zoom motor.	⇨Press zoom pushbutton. ⇨Adjust zoom by rotating it (see Page 28).
No XY movement possible at one of the two handgrips.	Settings in control unit for joystick of effected handgrip are at DIC.	⇨Set joystick to XY movement (see Page 26).
The microscope is not balanced out exactly in the B axis.	Mounted accessory was not turned back to the working position during balancing out of the B axis.	⇨Balance out B axis again. Ensure that the accessories are turned back to the working position during balancing out of the B axis (see Page 16).
Swing arm cannot be moved.	Swing arm locked.	⇨Release lock (see Page 14).
The stand of the Leica M500 OH3 moves.	Footbrakes not locked.	⇨Engage footbrakes (see Page 14).
The range of movement of the Leica M500 OH3 is limited (swivelling, tilting, rotating, XY movement).	Cables laid to tightly.	⇨Lay cables again (see Leica M500 OH3 installation instructions).
	Video camera was not mounted properly and touches the microscope carrier.	⇨Mount video camera correctly.
Leica M500 OH3 is not balanced out properly.	Position of accessories was changed after balancing out.	⇨Balance out the Leica M500 OH3 (see Page 15).
Leica M500 OH3 cannot be balanced out.	Wheel counterweight used on the D axis cannot compensate for the mounted accessories.	⇨Change wheel counterweight on the D axis (see Page 30).
	Leica M500 OH3 was balanced out in the transport position.	⇨Take the Leica M500 OH3 out of the transport position and balance it out again (see Page 15).

Fault	Cause	Remedy
The image becomes blurry when the magnification is changed.	Parfocality not precisely set.	⇨Set individual dioptre values of the operating doctor (see Page 24).
Focus at microscope cannot be changed.	Switch for multifocal focus switched on.	⇨Switch off multifocal focus (see Page 19). Exception: You are working with a laser micromanipulator, at which this function was set for protection.
The image appears darkened through the microscope at the edge and the illumination field is outside the field of view.	Accessories not mounted precisely.	⇨Mount accessories exactly in the holders (see Page 33).

TV, photography

Fault	Cause	Remedy
Photographs/TV images blurry.	Microscope or video zoom adapter not precisely focussed.	⇨Focus precisely; use a graticule if necessary. ⇨Perform dioptre correction exactly according to the instructions.
The photographs have a bluish cast.	The wrong film type was used.	⇨Use daylight film.

Error messages at control unit

Fault	Cause	Remedy
Microscope needs initialisation	Microscope initialisation has failed.	⇨Select «Initialise microscope» in main menu 2 and confirm with «ok».
Microscope initialisation failed	Microscope initialisation has failed.	⇨Select «Initialise microscope» in main menu 2 and confirm with «ok».
No status response from microscope	Connection from stand to microscope interrupted, connection cable defective.	⇨Check connection cable and replace if necessary.

Electrical data

Power connection for Leica M500 OH3:	1000 VA 50/60 Hz 100 V (+10 %/–15 %) 120 V (+10 %/–15 %) 220 V (+10 %/–15 %) 240 V (+10 %/–15 %)
Protection class:	class 1
Protection type:	type B

Leica M500 N

Microscope

Magnification changer:	zoom 6:1, motor-driven
Working distances:	207–407 mm; motor-driven multifocal eyepiece; continuously adjustable; can be adjusted manually
Focusing:	with motor-driven multifocal eyepiece; can be adjusted manually
Eyepieces:	wide-field eyepieces for spectacle wearers 10x; 12.5x dioptre adjustment ±5 dioptres; with adjustable eyecup
Objectives:	multifocal eyepiece; working distance – continuously adjustable from 207–407 mm (with motor)
Illumination:	to the illumination system adapted for microsurgery; diameter and brightness of the illumination field with manually-variable zoom optics Main illuminator and backup illuminator: high-power 300 W xenon lamp; entirely independent electrically; brightness control via six-step rotary switch at constant colour temperature
Microscope control unit:	graphical LCD with background lighting; individual user settings can be saved for up to eight users; in-built self-diagnosis system

Optical data

Total magnification:	with 10x eyepiece: 1.4x to 13.7x
Field of view (dia. in mm):	with 10x eyepiece: 16 to 150

Microscope carrier

Rotation range:	540°
Balancing:	ABC axes fully automatic, each can be corrected manually
Brakes:	one brake for A/B axis one brake for C axis

Fibre-optic cable

Length:	4500 mm
Active diameter:	7 mm
Minimum bending radius:	35 mm

Accessories

Binocular tube:	variable viewing angles 30°–150°; in-built eye-base adjuster with fixed setting to 45° or variable viewing angles 0°–180°
Beam splitter:	two side outlets with light distribution 50 % to 50 % or 70 % to 30 %
Video-zoom tube:	zoom 3:1; focal lengths 35–100 mm; with C mount; can be focussed individually
Viewing by a second person:	180° dual stereo attachment with light distribution 70 % to 30 % or stereo second-observer attachment for beam splitter or Leica ULT500 or Leica DI C500

Floor stand

Model:	floor stand with fully-automatic balancing system and six electromagnetic permanent magnetic brakes
Use:	carries and positions the Leica M500 N surgical microscope
Brakes:	six electromagnetic brakes; actuation via pushbutton on handgrip
Balancing:	automatic balancing in all axes and directions
Handgrips:	zoom adjustment working distance adjustment for multifocal objective ALL-FREE button releases all six brakes on stand side selector button configurable with three user-defined brakes motorised XY adjustment or navigation of DI C500 functions via joystick
Stand control unit:	main/backup illuminator triggering automatic balancing status display of balancing manual balancing of D axis setting XY speed switchover FOCUS LOCK - XYZ FREE
Load:	min. 8.0 kg and max. 11.7 kg from dovetail microscope interface
Space requirement:	Foot: 720 x 720 mm min. height in parked position: 1850 mm
Weight:	approx. 266 kg with full load
Range:	Cantilever: max. 1520 mm

Standards

EN 60601-1
EN 60601-1-2
UL 2601-1

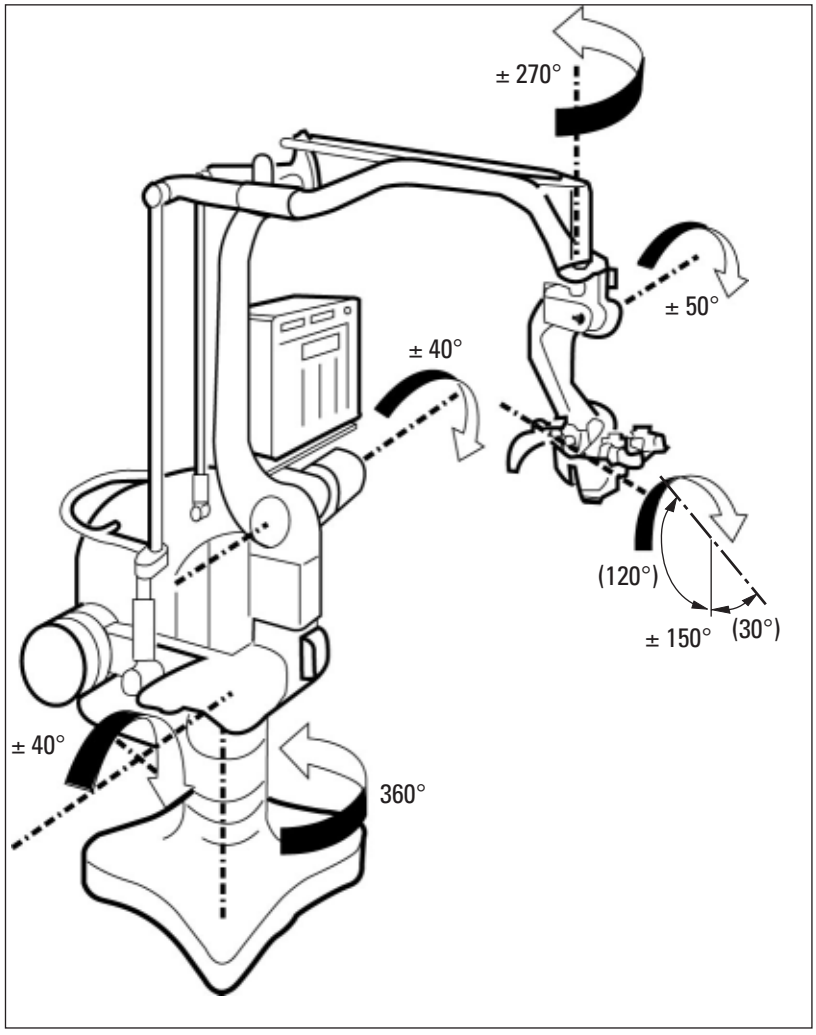
Environmental conditions

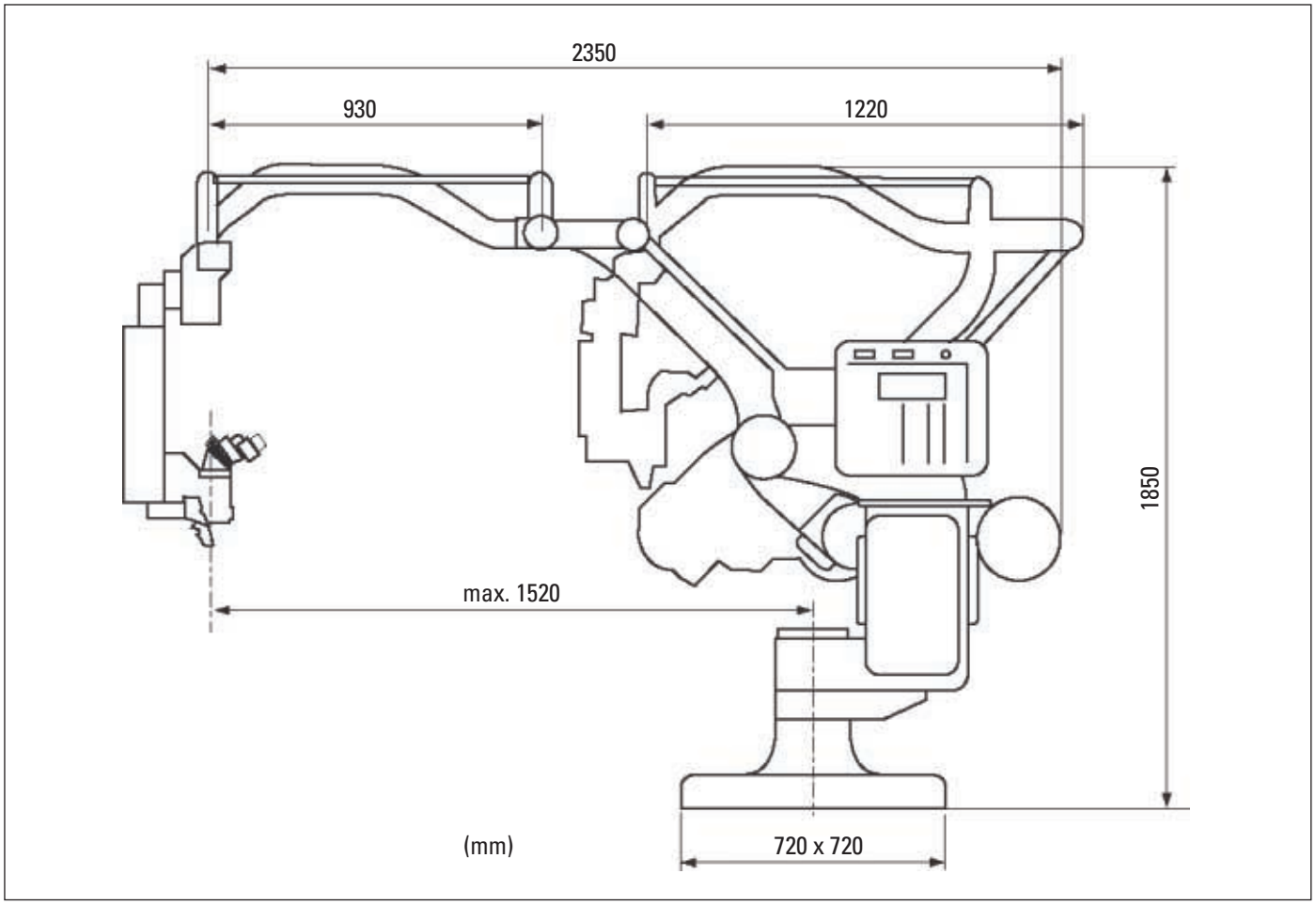
Use:	+10 °C to +40 °C +50 °F to +104 °F 30 % to 95 % relative humidity 500 mbar to 1060 mbar air pressure
Storage:	–40 °C to +70 °C –40 °F to +158 °F 10 % to 100 % relative humidity 500 mbar to 1060 mbar air pressure

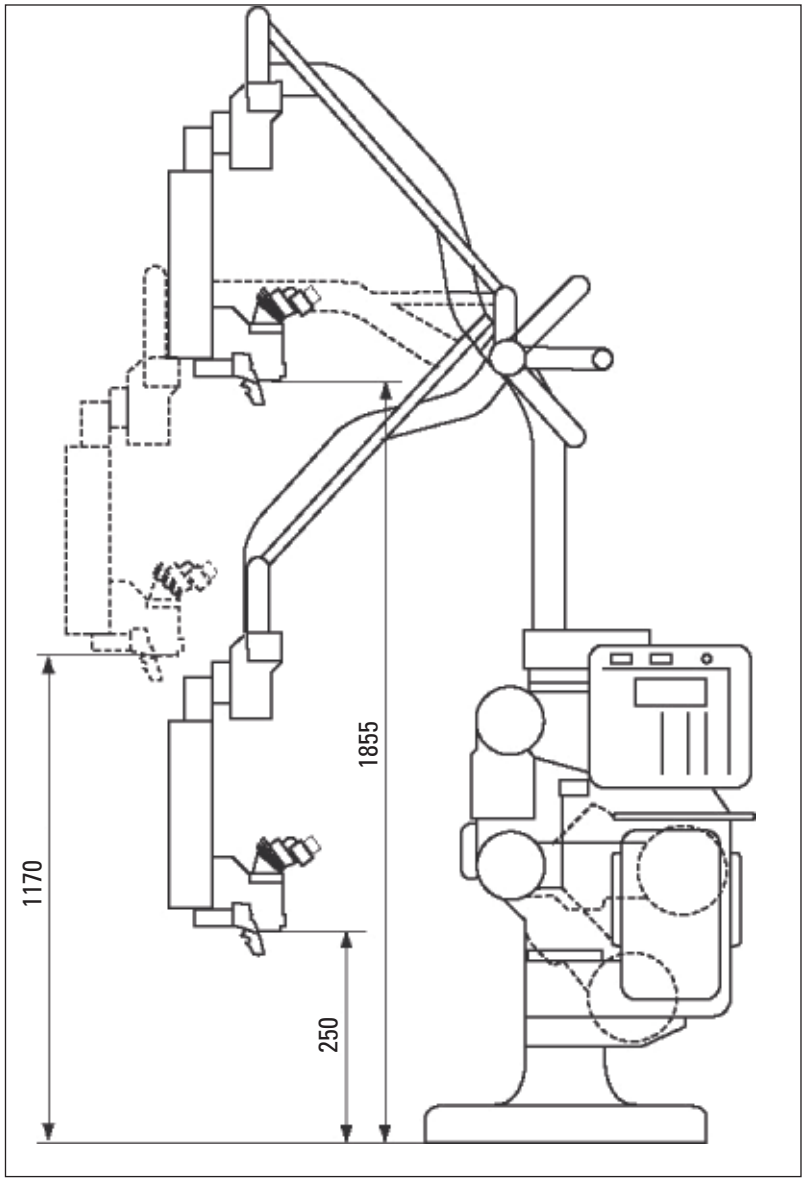
Limitations on use

The Leica M500 OH3 is only for use in closed rooms and on a strong floor.

Dimensional drawings




2350
930
1220
1850
max. 1520
(mm)
720 x 720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The Business Unit SOM, within Leica Microsystems, holds the management system certificates for the international standards ISO 9001 and ISO 14001 / EN 46001 relating to quality management, quality assurance and environmental management.

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Specimen Preparation
We specialize in supplying complete solutions for histology and cytopathology.

Imaging Systems
With confocal laser technology and image analysis systems, we provide three-dimensional viewing facilities and offer new solutions for cytogenetics, pathology and material sciences.

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Innovative technologies in our surgical microscopes offer new therapeutic approaches in microsurgery. With automated instruments for ophthalmology, we enable new diagnostic methods to be applied.

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Our automated, leading-edge measurement and inspection systems and our E-beam lithography systems make us the first choice supplier for semiconductor manufacturers all over the world.

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Leica
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Leica M500 OH3

Assembly instructions

10 711 895 – Version -

Leica

MICROSYSTEMS

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These assembly instructions contain important safety instructions as well as information on setting up the instrument.

Before attempting to set up or use the product read carefully through the assembly instructions.

Intended use of instrument

- The Leica M500 OH3 surgical microscope system is an optical instrument which uses magnification and illumination to improve the display of objects.
- It can be used for observation, documentation as well as in human and veterinary surgery.
- The Leica M500 OH3 surgical microscope system may only be used in closed rooms and beneath a strong ceiling.

Directions for the person responsible for the instrument

- Ensure that the surgical microscope is used only by qualified personnel.
- Carry out regular inspections to make sure the user is complying with safety requirements.
- Brief the user thoroughly and explain the meaning of the hazard signs and safety instructions.
- Allocate responsibilities for getting the instrument ready for work, for operating it and for maintaining it. Monitor compliance with this.
- Do not use the Leica M500 OH3 surgical microscope system unless it is in perfect condition.
- If any faults develop which might put the safety of people at risk, contact your Leica representative immediately or Leica Microsystems (Switzerland) Ltd., CH-9435 Heerbrugg.
- The effect of the Leica M500 OH3 surgical microscope on other instruments has been tested as specified in EN 60 601-1-2. The system has passed the tests relating to emissions and immunity. Respect the usual precautionary and safety measures relating to electromagnetic and other forms of radiation.
- Any liability for the functioning of the system will always be the liability of the owner or operator of the system should the system have been incorrectly installed by persons not so commissioned by Leica Ltd.

Directions for the user

- If you use accessories from another manufacturer with the Leica M500 OH3 surgical microscope system, make sure that this manufacturer confirms that the combination is safe to use. Follow the instructions in the user manual in question.
- Follow the instructions given in this manual.
- Follow the instructions given by your employer regarding the organization of work and safety at work.
- Modifications may not be carried out to the Leica M500 OH3 surgical microscope system.

Disposal

- The relevant national statutory provisions shall apply to the disposal of the products.

Symbols in these assembly instructions

The symbols used in these assembly instructions have the following meaning:

Warning
This indicates a potentially hazardous situation which could result in death or serious injury.

Caution
This indicates a potentially hazardous situation which could result in minor or moderate injury but possibly considerable material, financial or environmental damage.

Usage information: Information provided to help the user use the product technically correctly and also efficiently.

⇨Action required: This symbol indicates that you need to perform a specific action or series of actions.

Goods inward check/delivery inspection

Damaged goods reduce the safety level.
The use of damaged products can cause severe injury.
Check the packaging and goods for transport damage:

- The transport container should be undamaged.
- The delivery as listed in the order folder should be complete.
- The optional accessories as listed in the order folder should be complete.
- The user manual should be present.

If damage has occurred, have the safety of the goods inspected by the Leica service workshop before using them.

Safety directions in these assembly instructions

Caution
Damage to microscope if the screws are tightened too excessively!
⇨Avoid the use of excessive force when tightening all screws.
⇨Set the torque wrench to the torque specified. Apply the wrench until this torque is reached (signalled by a clicking noise). Do not tighten further.

Warning
Risk of severe personal injury when the stand moves in an uncontrolled manner!
⇨Lock the foot brakes during the mounting process.

Caution
Risk of injury through falling wheel counterweight!
⇨During the change, ensure that your feet are not under the wheel counterweight.

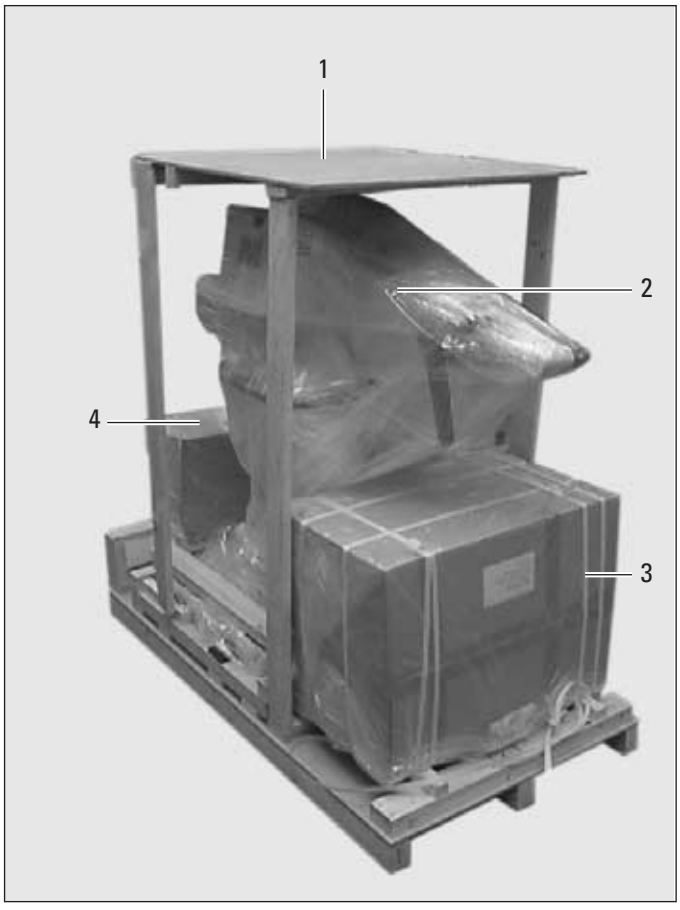
Caution
Risk of injury by falling wheel counterweight or cover!
⇨During the change, ensure that your feet are not under the wheel counterweight or the cover.

Warning
Risk of injury by movements of the microscope during balancing out!
⇨Do not remain in the immediate vicinity of the microscope during balancing out.

Caution
Damage to the microscope if cables get caught!
⇨Make sure that cables do not get caught between the microscope carrier and the cover and the microscope carrier.

Unpacking the transport container

Contents



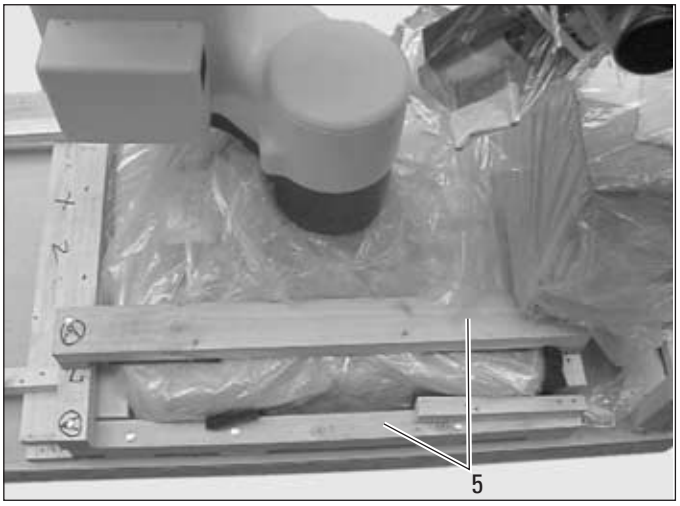
1 Ramp
2 Stand OH3
3 Crate with fitting parts
- Microscope carrier
- Handles
- Tool set
- Xenon illumination unit
- Diverse fitting parts

4 Crate with weights

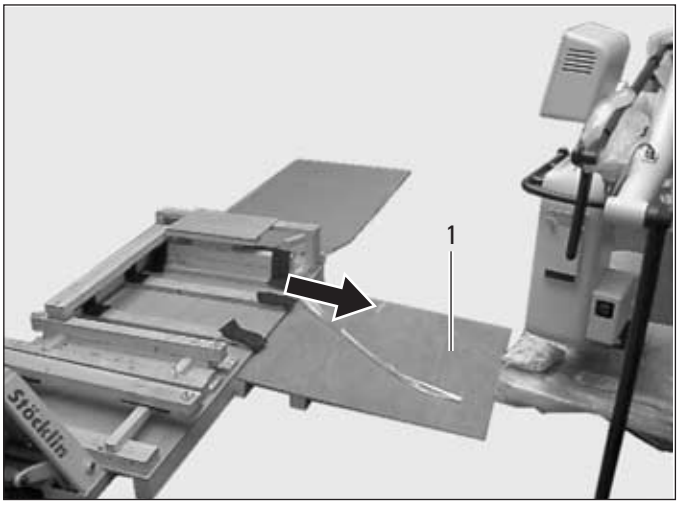
⇨Remove all the screws (hexagon, width across flats 10) from the side wooden strips of the carton package.
⇨Remove the carton package of the transport container upwards.

☞ Do not remove the packaging material of the stand before it is no longer positioned on the pallet.

⇨Remove the fixing planks (5) at the base of the stand.



⇨Place the ramp (1) before the pallet and travel the stand down carefully.
⇨Remove the packaging material of the stand.



☞ Have the following tools and materials ready before you start assembling the Leica M500 OH3 surgical microscope.

☞ You will need assistance for some of the work.

Accessories supplied

- All screws and nuts
- 2 piece reserve fuses 5 A and 10 A each
- 2 heavy and 3 light wheel counterweights

Tools

- Screwdriver for cross-head screws (size 00)
- Socket wrench with T grip (17 mm)
- 1 set of Allen keys
- Open-ended wrench 22 mm
- Screwdriver with grip for hexagon socket head screws (size 2.5 mm)

Assembly material

- Cable ties

Tightening moments for hexagon screws

⚠ **Caution**
Damage to microscope if the screws are tightened too excessively!

⇨Avoid the use of excessive force when tightening all screws.

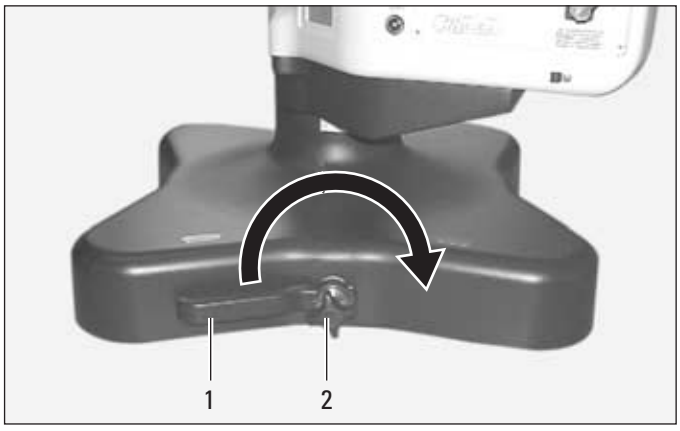
⇨Set the torque wrench to the torque specified. Apply the wrench until this torque is reached (signalled by a clicking noise). Do not tighten further.

Mounting the OH3 stand

Locking the OH3 stand

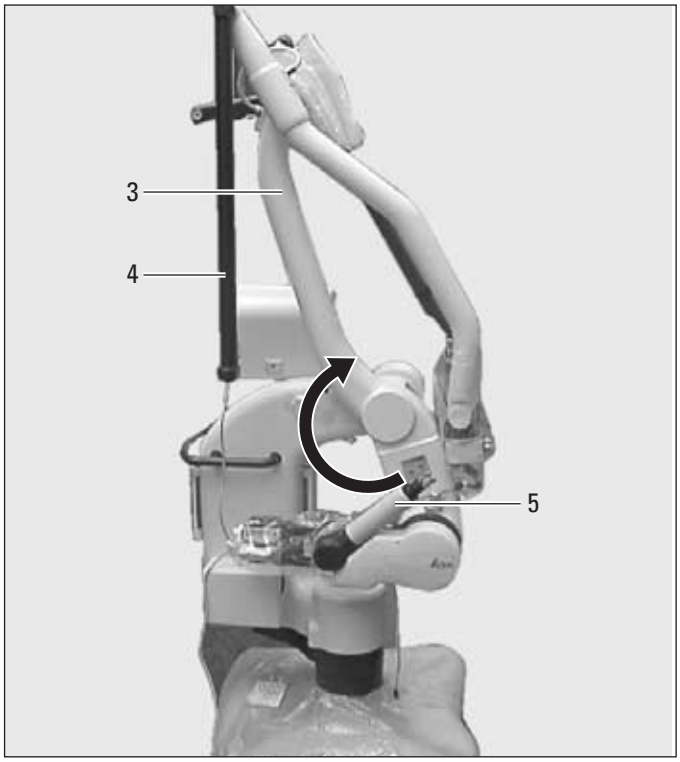
Warning
Risk of severe personal injury when the stand moves in an uncontrolled manner!
⇨Lock the foot brakes during the mounting process.

⇨Push the OH3 stand to the mounting site.
⇨Loosen the star grip (2) at the stand base.
⇨Turn the lever for the foot brake (1) to the right.
⇨Tighten the star grip again.

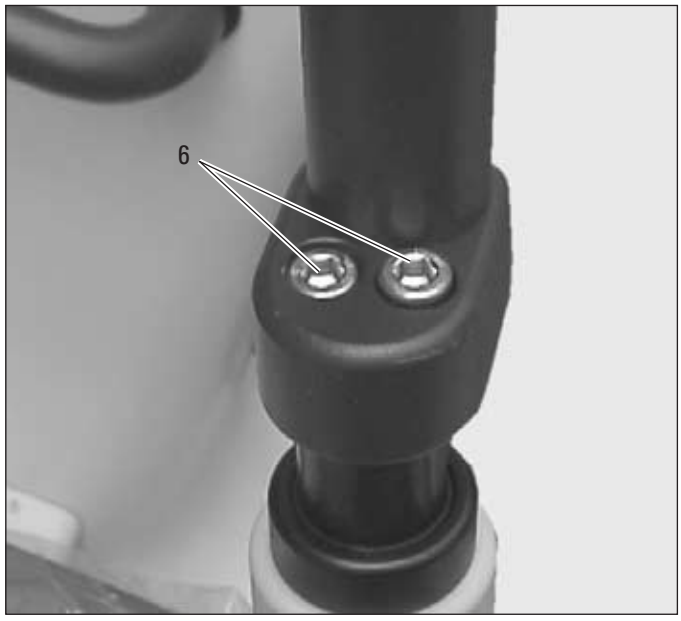


Mounting the connecting arm

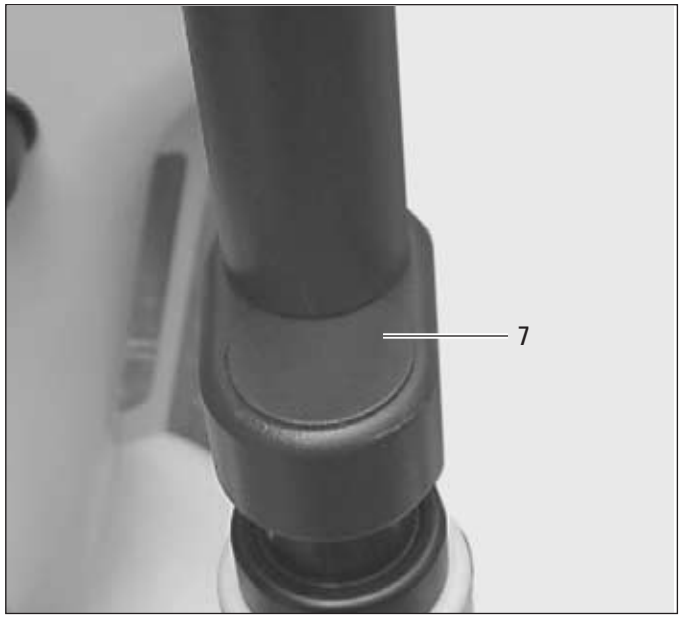
⇨Lift the swing arm (3) upwards.



⇨Connect the tension rod (4) to the arm (5) of the balancing unit.
⇨Tighten both Allen screws M10 x 45 (6) alternatively (tight slots!) (torque 43 Nm).

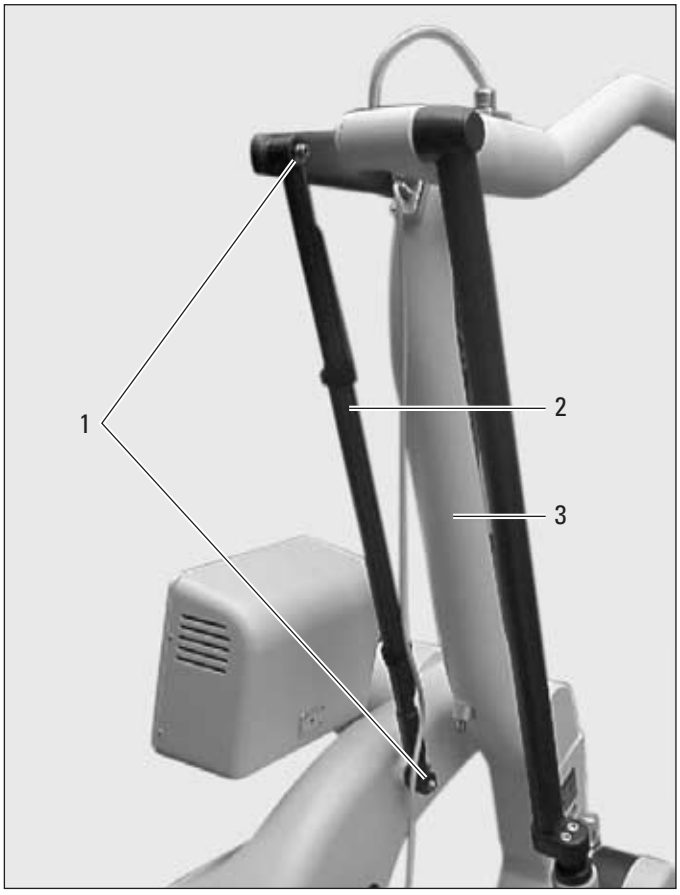


⇨Apply the cover (7).

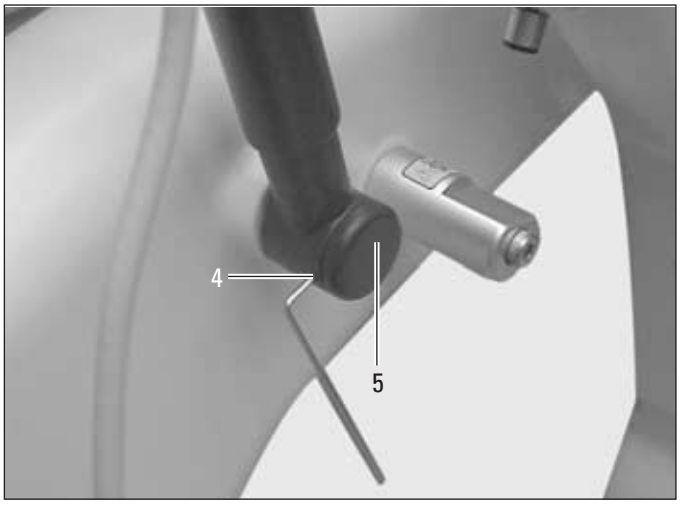


⇨Fasten the vertical cable channel (2) with 2 screws (1) M6 x 55 (torque 10.4 Nm).

☞ The open side of the cable channel (2) has to face the vertical arm (3).



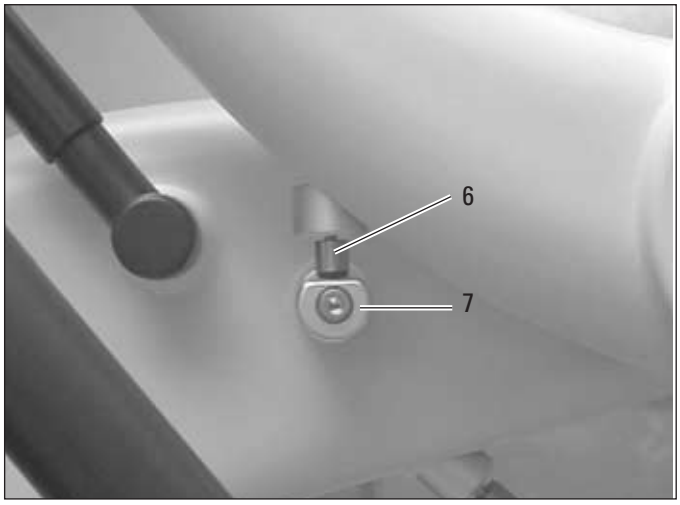
⇨Apply the upper and lower cover (5) and secure them with Allen screws (4).



Mounting the stop for the swinging arm

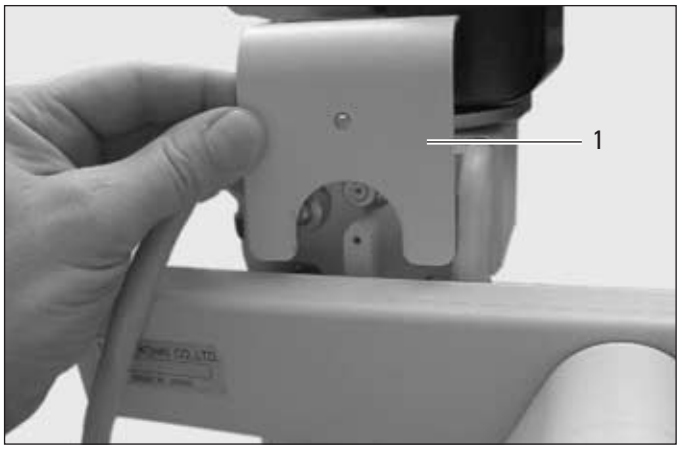
⇨Screw on the stop (7) with a screw M8 x 70 (torque 26 Nm).

☞ The flattened surface of the stop has to point to the shock absorber (6).

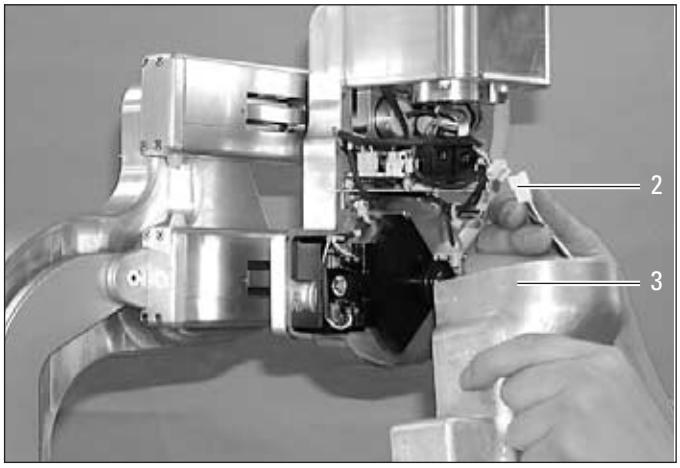


Mounting the microscope carrier

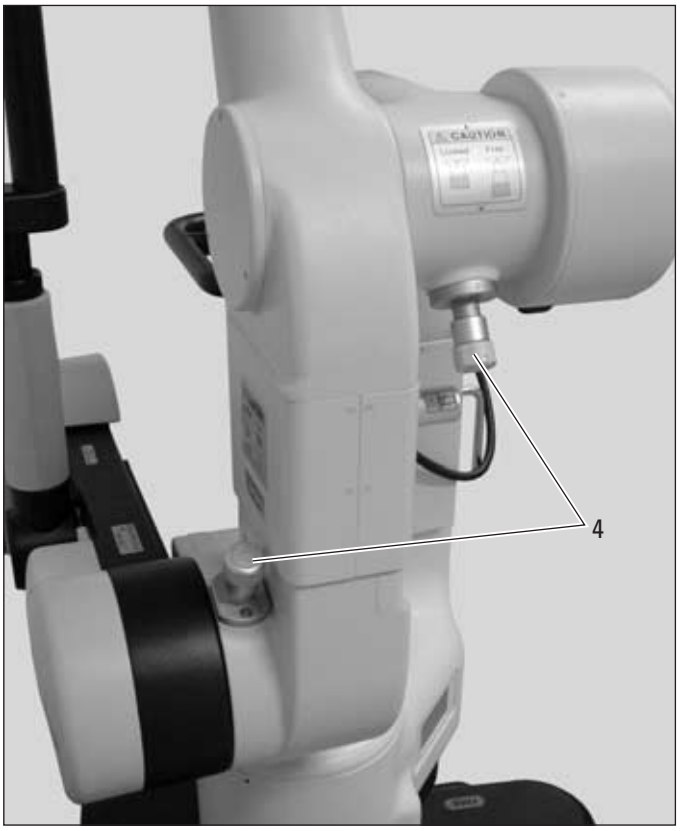
⇨Screw off the cover (1) at the microscope carrier.



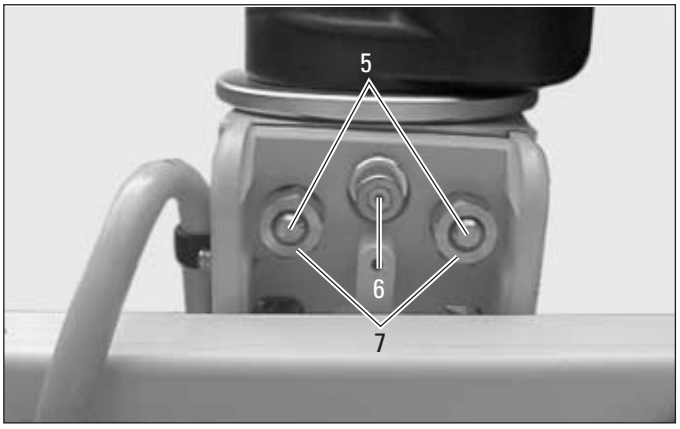
⇨Screw off the 2 screws and remove the cover (3).
⇨Loosen the connector (2).



⇨Lock the Leica M500 OH3 using the locking knobs (4) (see user manual for Leica M500 OH3).

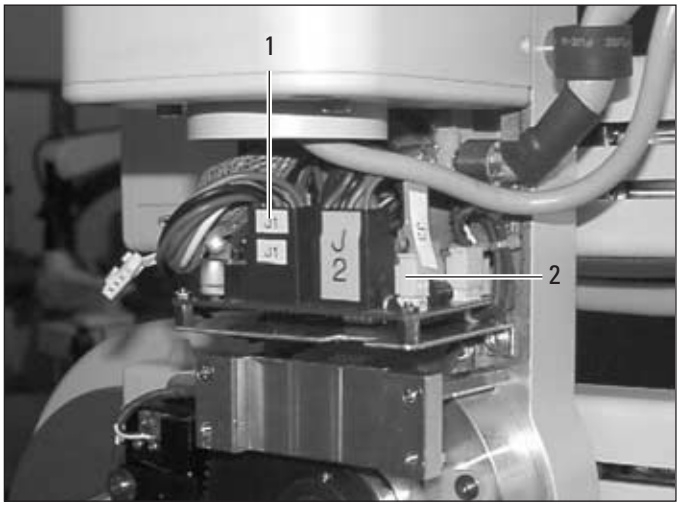


⇨Suspend the microscope carrier from the 2 threaded bolts (5) and the eccentric pin (6).
⇨Screw tight with two special fixing nuts M10 (conic rear) (7) (torque 26 Nm).

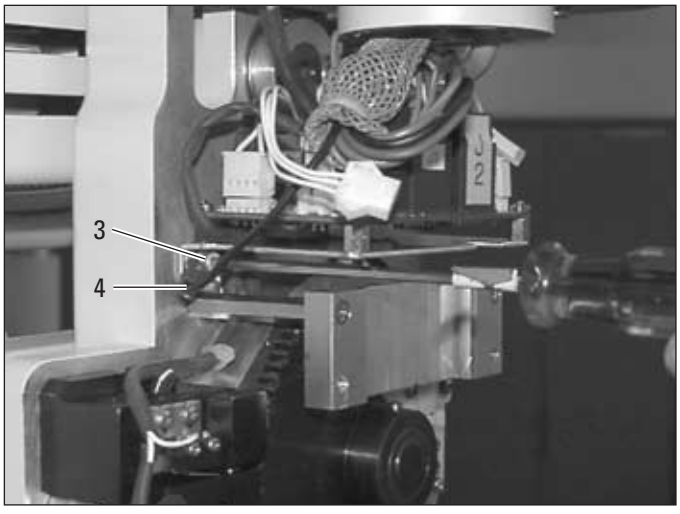


Establishing electrical connections

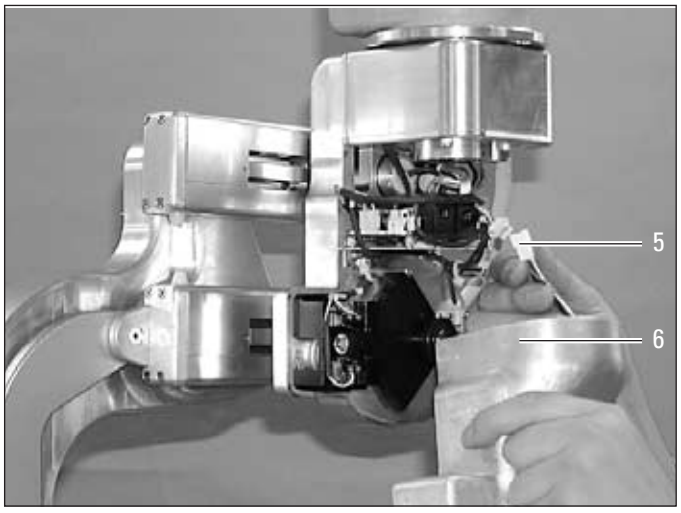
⇨Connect the cable connector J1 (1).
⇨Connect the cable connector J3 (2).



⇨Screw the earthing cable (4) to the microscope carrier by means of the screw (3).

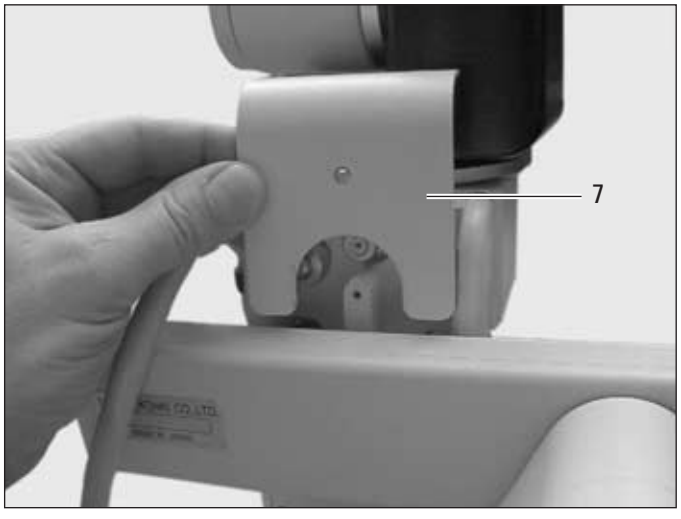


⇨Establish the electrical connection between the cover (6) and the microscope carrier by means of the connector (5).



Caution
Damage to the microscope if cables get caught!
⇨Make sure that cables do not get caught between the microscope carrier and the cover and the microscope carrier.

⇨Fasten the cover (6) by means of 2 screws to the microscope carrier.
⇨Re-attach the cover (7) to the microscope carrier.

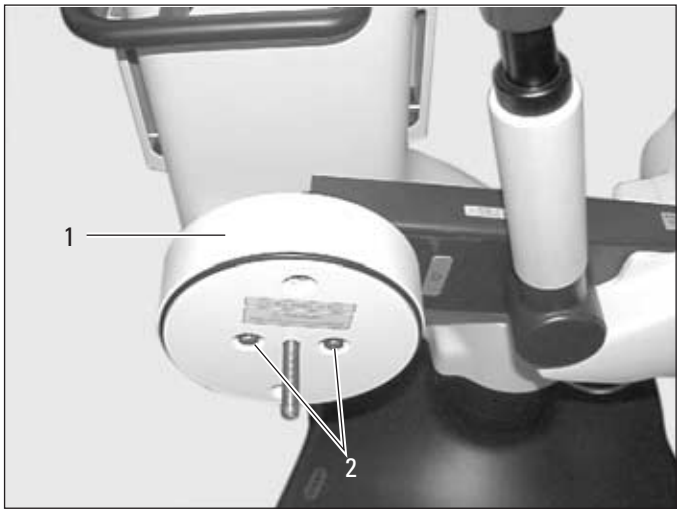


Mounting the weights

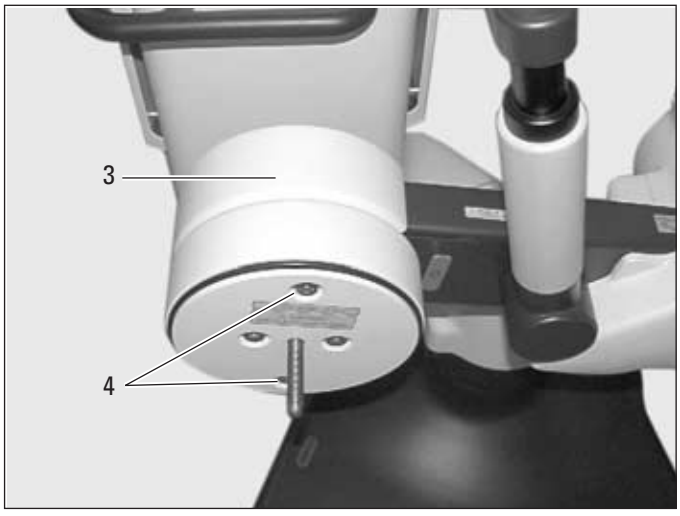
Caution
Risk of injury through falling wheel counterweight!
⇨During the change, ensure that your feet are not under the wheel counterweight.

☞ Do not yet mount the removable wheel counterweight and cover yet!

⇨Mount the front wheel counterweight (1) by means of two hexagon nuts M10 (2) (torque 30 Nm).



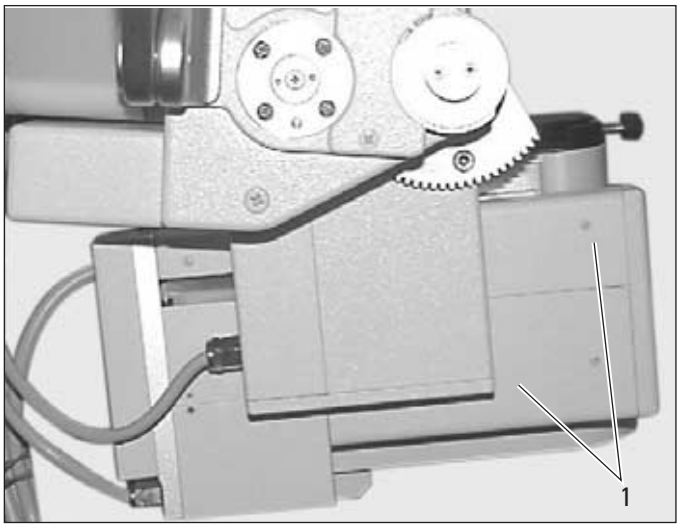
⇨Mount the rear wheel counterweight (3) by means of two hexagon nuts M10 (4) (torque 30 Nm).



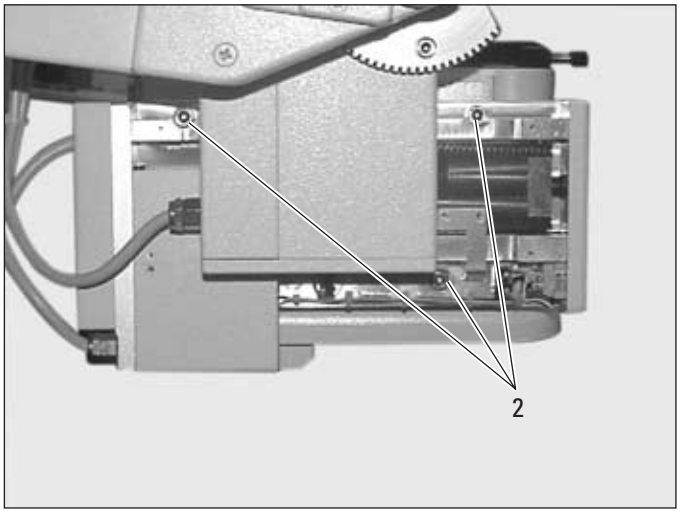
⇨Plug in the connector (5) of the cable connection at the balancing unit.

Mounting the optics carrier

⇨Remove the covers (1) at the A sledge.



⇨Fasten the optics carrier by means of 3 screws M5 x 15 (2) to the microscope carrier.



⇨Screw the covers (2) back on.

Mounting handgrips

☞ Only use the screws supplied to mount the right-hand handgrip. Longer screws can damage the optics carrier.

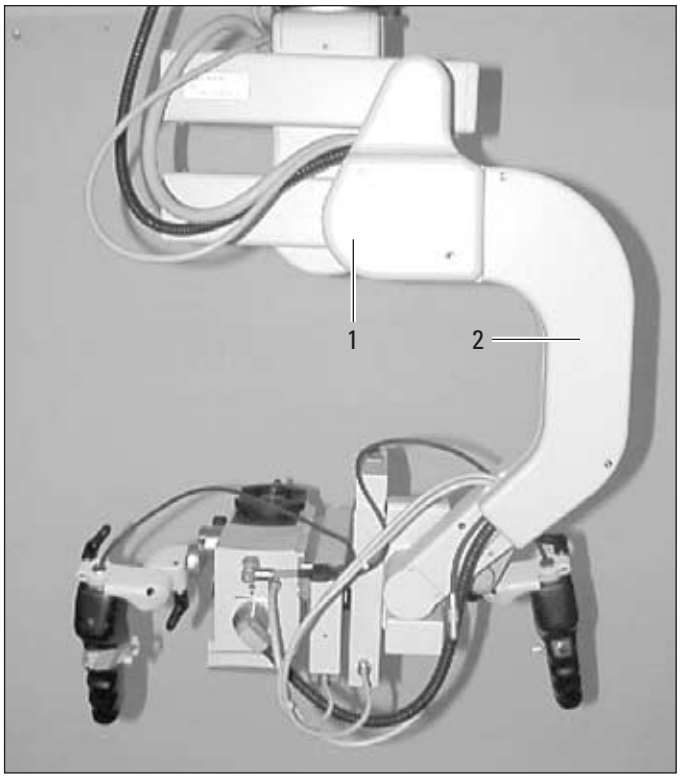
⇨Insert the shaft (3) of the right-hand handgrip into the optics carrier and secure it with four screws.

☞ The shaft can also be mounted displaced by 45°.

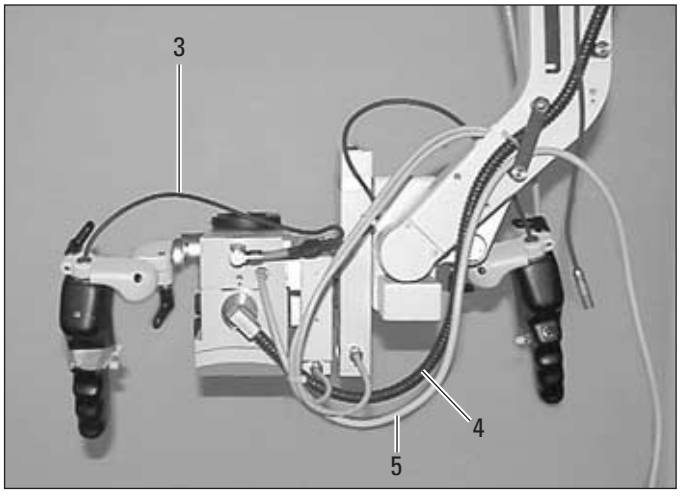
⇨Screw off the cover (5) and mount the left-hand handgrip to the shaft (4).
⇨Turn the left-hand handgrip to the desired position and tighten by means of the clamping screw (6).
⇨Mount the cover (5) again.

Cabling the microscope carrier

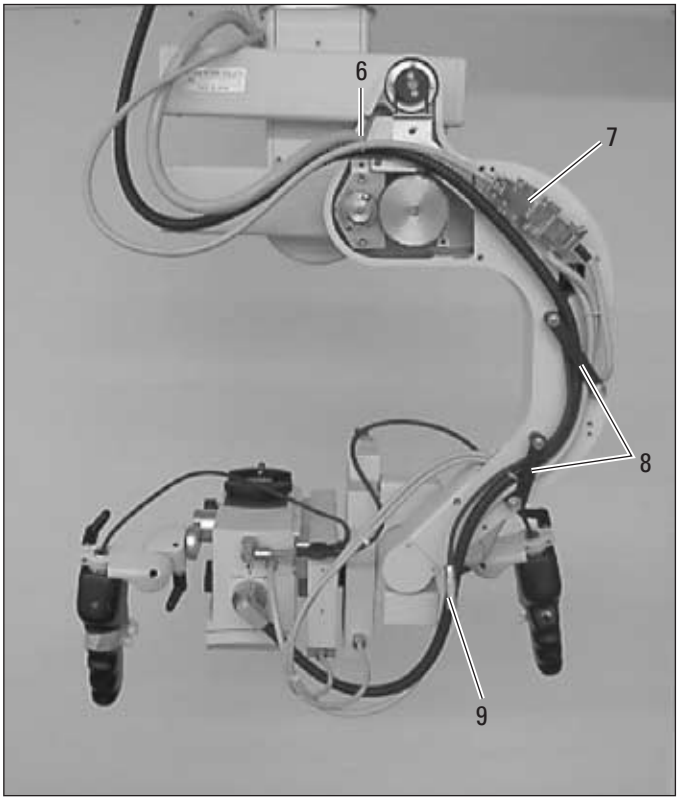
⇨Remove covers (1) and (2).



⇨Position the microscope carrier in the middle position of the 540° rotation range.
The green markings have to match.
⇨Lay the handgrip cable (3) as shown in the figure below and insert it into the optics carrier.
⇨Connect the fibre-optic cable (4) to the optics carrier.
⇨Bring together the CAN cable (5) from the optics carrier with the fibre-optic cable (4) and lay them so that the marking (6) of the fibre-optic cable lies at the microscope carrier entry.



⇨Lay the fibre-optic cable, CAN cable and mouth switch cable (9) in the microscope carrier in accordance with the figure below.
⇨Secure the connector (7) of the CAN cables by means of 2 screws.
⇨Secure the cables by means of the retaining brackets (8).
⇨Attach loose cables to each other using cable ties.



⇨Fasten the covers (1) and (2) by means of 2 screws each.

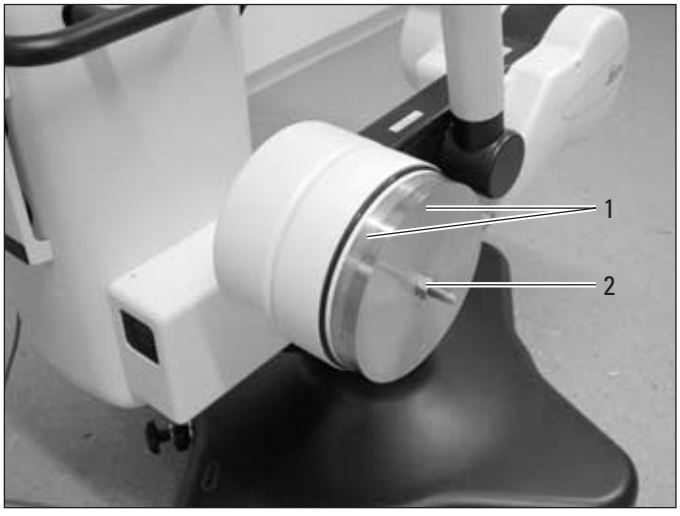
Laying a video cable or other additional cables

⇨Lay the video cable or other additional cables through the cable channel and the microscope carrier along the fibre-optic cable (4).

Mounting the removable wheel counterweight and cover

Caution
Risk of injury by falling wheel counterweight or cover!
⇨During the change, ensure that your feet are not under the wheel counterweight or the cover.

⇨Mount the accessories in the allowed weight range and lock the Leica M500 OH3 (see user manual for Leica M500 OH3).
⇨Slide on 2 thick and 2 thin counterweights (1) and screw tight by means of a hexagon nut (2).



⇨Screw the cover (3) onto the threaded rod and tighten it.

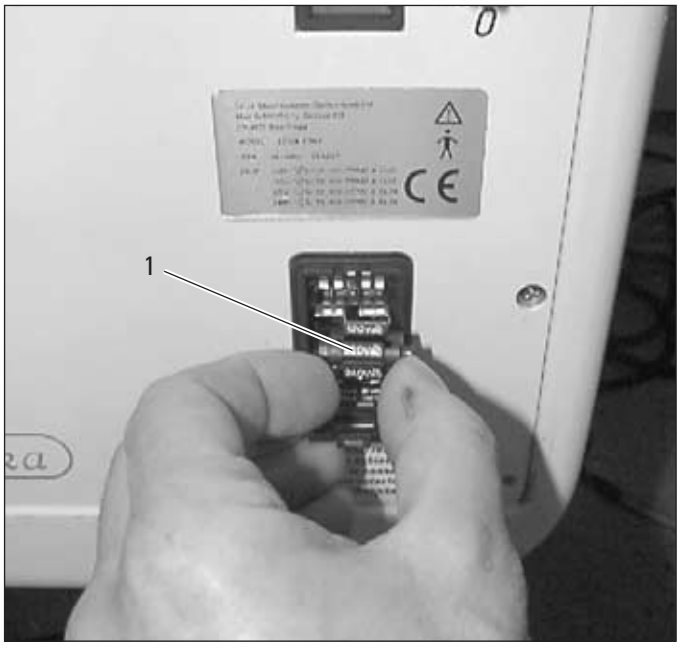
Checking and setting the voltage

⇨Check in the window (4) above the power plug whether the country-specific voltage is set.

Modifying the set voltage

⇨Use the screwdriver to remove the cover (5).

⇨Remove the drum (1), turn to the correct voltage and insert it again.

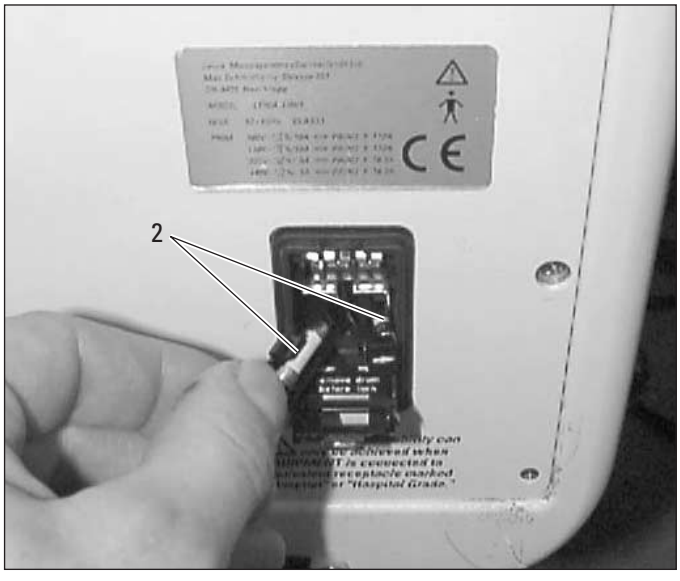


⇨If necessary, replace the fuses.

Checking/Setting fuses

Range 220 V–240 V: Two 5 A fuses, slow blow
Range 100 V–110 V: Two 10 A fuses, slow blow

☞ If the voltage range is changed, be sure to check the fuses (2) and replace them, if necessary.



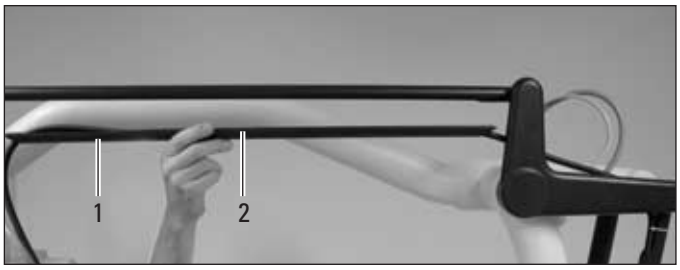
⇨Remove the fuses (2) from the holders and check the type. Replace, if necessary.

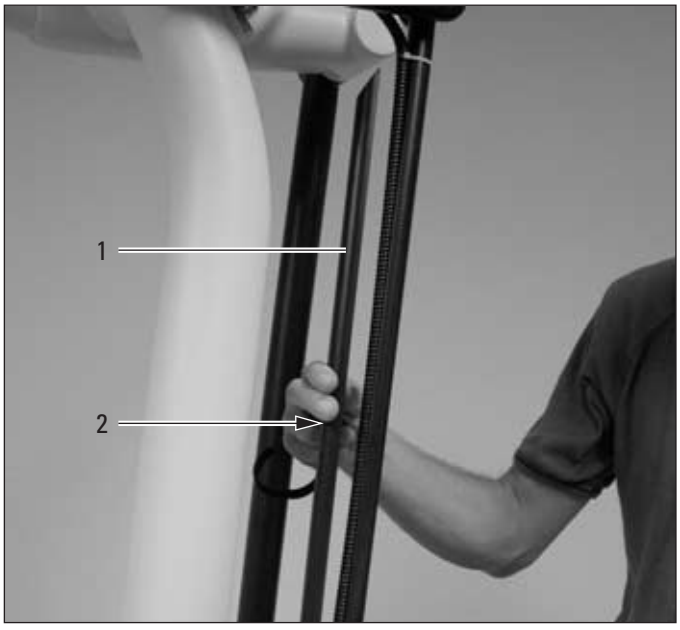
☞ The respective other fuse type is positioned under the cover (3) of the base pedestal.

⇨Plug in the power plug (4) and suspend the power cable in the cable bride (5) (strain relief).

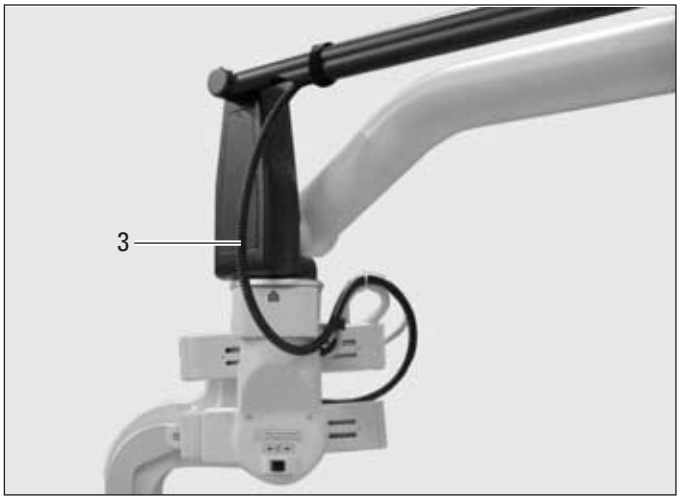
Mounting the fibre-optic cable

⇨Loosen the cable channels (1) and pull the fibre-optic cable in.



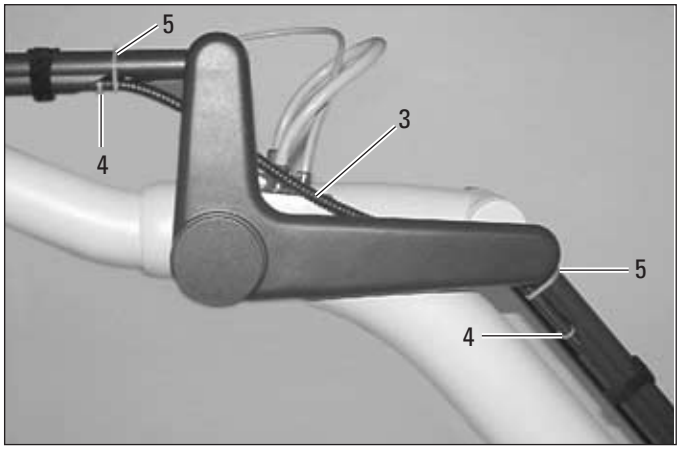


⇨Lay the fibre-optic cable (3) from the microscope carrier to the upper cable channel as is shown in the figure below.



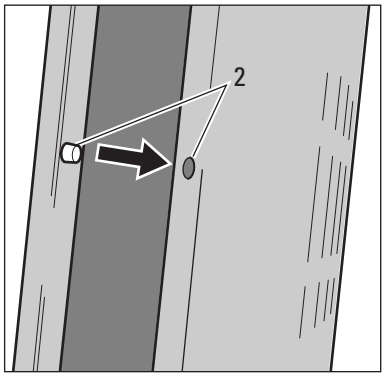
⇨Fasten the fibre-optic cable (3) in the stretched position of the stand by means of cable ties (5) to the cable channels.

☞ The markings (4) of the fibre-optic cable must be positioned next to the cable ties (5) of the fastenings.



⇨Close the cable channels again and fasten to each other by means of Velcro fasteners or cable ties.

☞ Positioning aids (2) are located at the cable channels (1) and must engage in the counter piece of the cable channel during installation.



Mounting lamps

⇨Open access hatch (1) for lamp inserts.

⇨Insert lamp inserts (2) and (5).

☞ When inserting a lamp insert make sure that the arrow (4) points to the right.

⇨Close access hatch (1) again.
⇨Connect the fibre-optic cable to connector (3) of the main illumination.

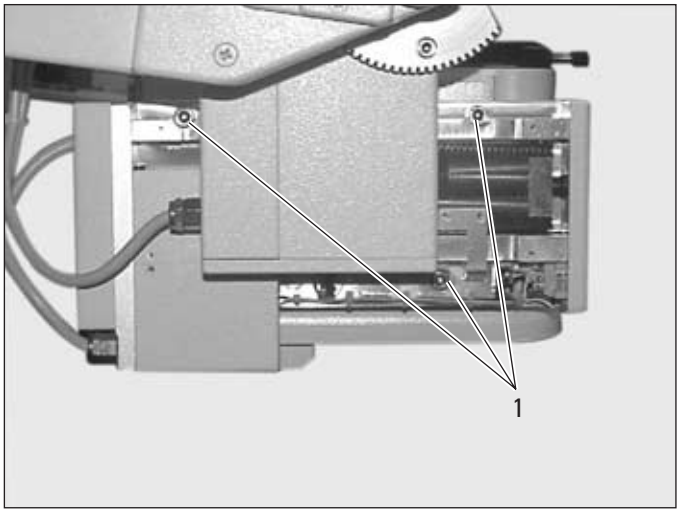
Disassembly

The Leica M500 OH3 is disassembled in the reverse sequence of operations to assembly.

When disassembling the optics carrier take care of the following:

☞ The Leica M500 OH3 has still to be operational!

⇨Move the A sledge to the central position.
The screws (1) are now accessible.



Checklist

❒Are all covers screwed on firmly?

❒Are all cables organized neatly?

❒Are all screws tightened with the specified torque?

❒Do any components contact each other when the Leica M500 OH3 is moved?

Balancing out the Leica M500 OH3

Warning
Risk of injury by movements of the microscope during balancing out.
⇨Do not remain in the immediate vicinity of the microscope during balancing out.

⇨Switch on the Leica M500 OH3.
⇨Refer to the Leica M500 OH3 user manual for the further actions.

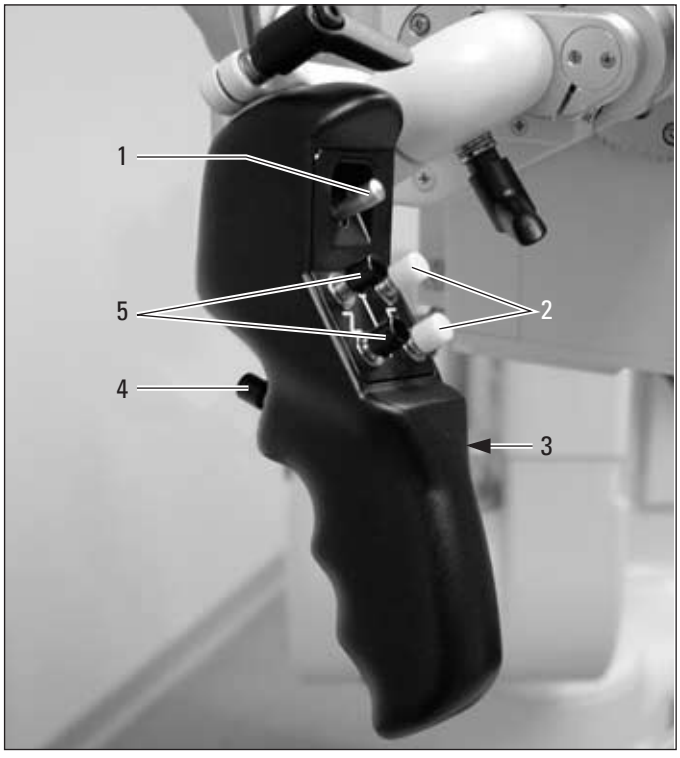
Checking the mobility

⇨Move the Leica M500 OH3 to the stretched position.
⇨Move each movable shaft until it stops. Ensure that cables have freedom of movement and are not tensioned.
If necessary:
⇨Loosen cables, increase size of cable loop and resecure with cable ties.

Carrying out functional checks

Further information on the tests listed here can be found in the Leica M500 OH3 user manual.

⇨Press ALL FREE button (4) on handgrip.
All brakes must be released.



⇨Press selector button (3) on handgrip.
The three brakes of the set brake grouping have to be released.
⇨Press the buttons for zoom (5) and focus (2).
⇨Check whether zoom and focus mechanisms on optics carrier move properly.
⇨Move the stand to its intended working position.
⇨Check each position of microscope to determine whether it remains in its position when brakes are released. There must be no perceptible upward, rearward or frontward tension. All movement must be silent and smooth.

Always allow the main and backup illuminators to remain lit for at least five minutes, otherwise the lighting capacity will be quickly reduced.

⇨Switch on the main illuminator and check its function.
⇨Plug over to the backup illuminator and check its function.
⇨Operate the joystick (1) at the handgrip.
The microscope carries out the corresponding XY movements.

Inspection and acceptance sequence

Once assembly or maintenance work is finished Leica Service will start the inspection and acceptance sequence.

The system as a whole should not be put into service until acceptance by Leica Service has taken place.

This inspection is aimed at determining whether
- the safety requirements concerning the protection of the patients and of the medical personnel have been met,
- the performance characteristics of the Leica M500 OH3 surgical microscope system are being delivered.

This is followed by the training of the personnel.

Acceptance certificate of the Leica M500 OH3 surgical microscope

Assembly and functional checking of the M500 OH3 surgical microscope was carried out properly in accordance with the regulations contained in the assembly instructions.

Name and address of the customer

Representative of the Leica Microsystems (Switzerland) Ltd.

Name

Address

Acknowledged Signature

Location Date

This delivery report is to be filled out by the responsible Leica representative.

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Our automated, leading-edge measurement and inspection systems and our E-beam lithography systems make us the first choice supplier for semiconductor manufacturers all over the world.

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05. Description - Leica M500 OH3

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Description of the M500 OH3

General

Description

The Leica M500 OH3 is a new neuro stand system, consisting of the new OH3 stand system and the existing M500 N microscope system. This description will mainly concern the stand system. The description of the M500 N microscope system find in the service manual M500 N doc.code 10665607

Product history

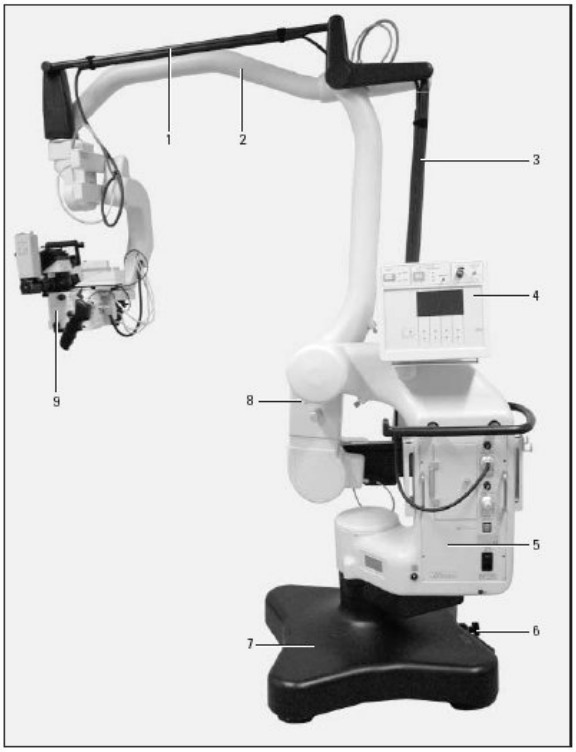
Product launch for U.S. market	November 2002
Products launch other countries	April 2003

Service- relevant product improvements

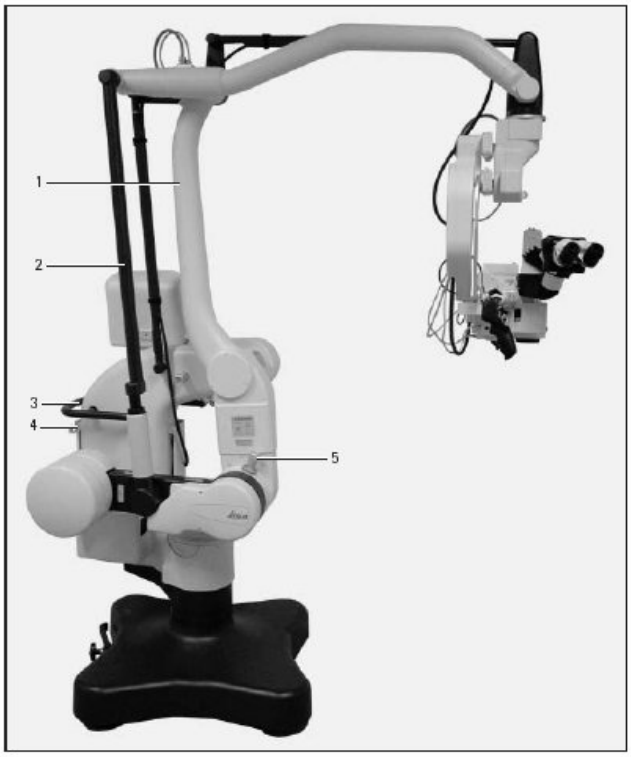
Date	With serial number	Concerning module	Description of product change	Remark
	20062	A/B module	2 springs from balance lever removed	
10/2002	20062	Brake 4 unit	New centre mark for 540 degree	
11/2002	20212	Handgrip joints	Thread with Helicoil	
11/2002	20212	Stand control unit: PLC 10711991	New SW version 1.04: improved balancing procedure and green light eliminated;	
12/2002	20362	Brake 4 unit	8 screws instead of 4	
01/2003	20503	D-balance module	Mechanical stop for D-axis	Additional rubber-piece on part “fixed weight rear”

Structure of construction

Overview



1	Horizontal arm
2	Swing arm
3	Vertical arm
4	Stand control unit
5	Illumination control unit
6	Footbrake
7	Base



1	Swing arm large
2	Link arm
3	Column handle
4	Footswitch holder
5	Locking knob

Modules of the instrument

Base

- Wheels, brake, brake actuator
- Brake 1

Column

- Control unit with light house and Xenon bulbs
- Brake 2
- Lock for brake 2
- Power supply; transformator, DC power module

- Microcontroller PCB LOH1002
- Xenon power supply

Stand control unit

- M500 N control unit
- PCB LOH adapter
- PCB LOH1001
- PLC

D-balance module

- Brake 3
- D-balance unit: drive for D-weight
- D-balance motor
- Balance mechanism: solenoid and switches
- Removable weights

Swing arm large

- Lock for brake 3
- Link arm
- Vertical arm with damper
- Horizontal arm
- Brake 4 unit

Swing carrier (swing arm small)

- A/B slide module; A motor, B motor
- Brake 6 with A/B balance module
- C-module; Y-motor, C-sensing unit
- Y-motor
- PCB LOH1003
- PCB LOH1004

Handgrip

- PCB CAN controller left
- PCB CAN controller right
- Switches
- Joint left and right

Overview of system articles

The Leica M500 OH3 system consists of the following system articles:

Description	Short name	Number	Stock n°
Stand system Leica OH3, including:		**1**	**10448015**
OH3 Xenon bulb		2	10448022
M500 N Optics carrier OH3		**1**	**10448019**
Installation manual		1	10711895
User manual*		1	10711894
Quick reference guide		1	10xxxxxx

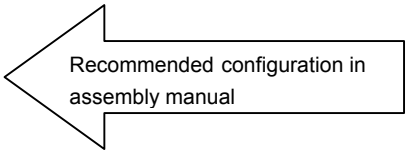
*New concept for user manuals:

The user manual is included as a CD-ROM, containing the manual in 14 languages. The English and German versions are included in paper form, too.

Accessories

Various accessories, up to 11.6 kg, can be adapted onto the dovetail microscope interface. Weight discs can be added or removed to the D-balance unit and allow to align the balancing range to the customer's equipment. The recommendation in the assembly manual (2 heavy discs and 2 light discs mounted) covers the weight range of 7.4 kg up to 10,9 kg, which will fit to the most common configurations. If the customer's equipment is out of this range, discs need to be added or removed:

Number of weight discs		D-Load range [kg]	
Heavy	**Light**	**Minimum**	**Maximum**
2	0	6.1	9.65
2	1	6.65	10.22
2	**2**	**7.4**	**10.88**
2	3	7.9	11.54



Generally, all accessories from the M500 N series do fit to the M500 OH3 system. All foot- and hand switches are compatible and can be connected to the M500 N control unit. A mouth switch can be connected as well. The current options as

- Leica DI C500
- Leica ULT500
- Leica D2D
- Leica Autofocus AF500

are possible to be integrated to the Leica M500 OH3 system. The two external functions of the M500 N control unit allow controlling additional equipment by footswitch. One CAN connector of the control unit stays free – to be connected to an IGS system.

Technical data

Electrical data

Power connection for Leica M500 OH3:	1000 VA 50/60 Hz 100 V (+10 %/–15 %) 120 V (+10 %/–15 %) 220 V (+10 %/–15 %) 240 V (+10 %/–15 %)
Protection class:	class 1
Protection type:	type B

Microscope carrier

Rotation range: 540°	
Balancing:	ABC axes fully automatic, each can be corrected manually
Brakes:	one brake for A/B axis one brake for C axis

Fibre-optic cable

Length:	4500 mm (new type 4800mm)
Active diameter:	7 mm
Minimum bending radius:	35 mm

Illumination:

Illumination system adapted to perform microsurgery; diameter and brightness of the illumination field with manually variable zoom optics
Main illuminator and backup illuminator: high-power 300 W xenon lamp; entirely independent electrically; brightness control via six-step rotary switch at constant colour temperature

Floor stand

Model:	floor stand with fully automatic balancing system and six electromagnetic permanent magnetic brakes
Use:	carries and positions the Leica M500 N surgical microscope
Brakes:	six electromagnetic brakes; actuation via pushbutton on handgrip

Balancing:	automatic balancing in all axes and directions
Load:	min. 8.0 kg and max. 11.7 kg from dovetail microscope interface
Space requirement:	
Foot:	720 x 720 mm
Min. height in parked position:	1850 mm
Weight:	approx. 266 kg with full load
Range:	
Cantilever:	max. 1520 mm

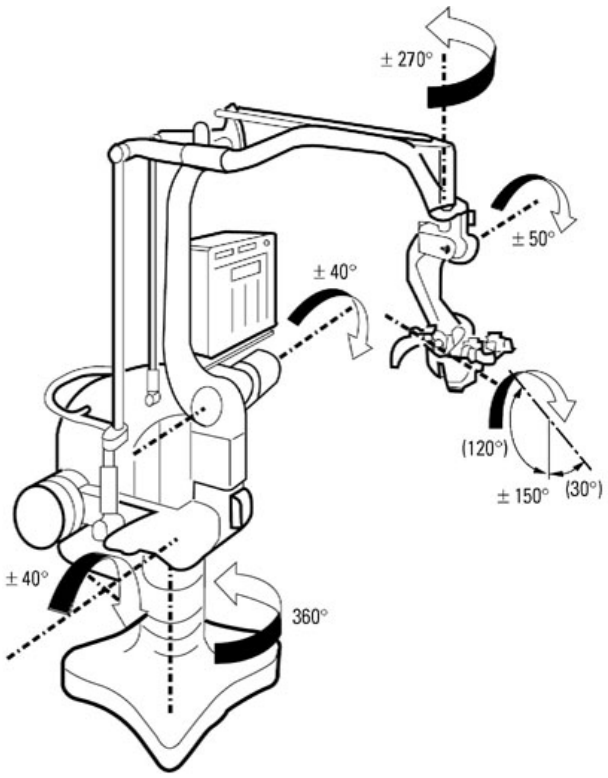
Standards

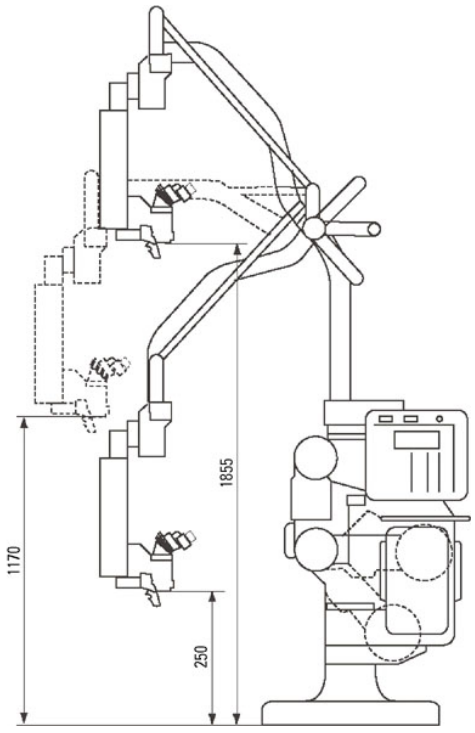
EN 60601-1
EN 60601-1-2
UL 2601-1

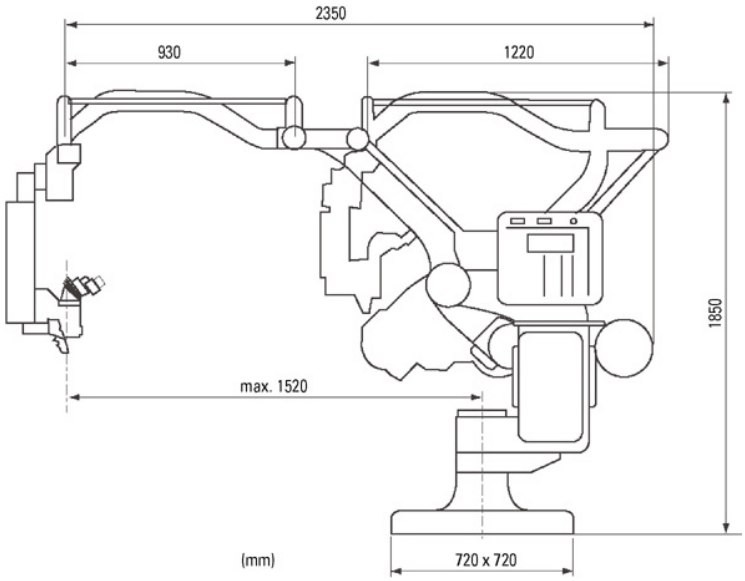
Environmental conditions

Use:	+10 °C to +40 °C +50 °F to +104 °F 30 % to 95 % relative humidity 500 mbar to 1060 mbar air pressure
Storage:	–40 °C to +70 °C –40 °F to +158 °F 10 % to 100 % relative humidity 500 mbar to 1060 mbar air pressure

Dimensional drawings







Principal description

Stand system

The stand system is based on the OH1. Improvements and new developments in mechanics and electronics leaded to a better functionality and an easier handling of the stand.

Mechanical damper

Different axes are equipped with damper parts. While the brakes are closed, the damper reduces vibrations to a minimum.

Electro magnetically brakes

The stand is blocked by 6 magnetically brakes. Pressing the rear handgrip knobs (all free button) releases all 6 brakes. The side handgrip knob allows releasing 3 brakes only: brakes 4, 5 and 6 or brakes 1, 2 and 3. The selection switch determines which brakes: in position "XYZ-free" the brakes 1, 2, 3 will release. In position "focus lock" the brakes 4, 5, 6 will release.
A mouth switch can also release the brakes 1, 2, 3.

Automatic balancing system

Each axis (A and B for the optics carrier, C for the swing arm and D for the stand) is automatically balanced. DC-motors with spindle drive move the appropriate axis. Balancing mechanisms are activated during the balancing procedure by solenoids. Each motor moves the weight/slide until switches show balanced condition.
Each axis can be "hand-balanced" by electrical switches. The appropriate motor is activated and moves to the desired direction.

Balancing procedure

The procedure starts by pressing the auto balance button on the stand control unit. A flap to inhibit unintentional activation protects it. The control starts to balance axis A while an acoustic signal appears. Then the optics carrier must be turned for 90°. Another operation of the auto balance button starts the balancing of axis B. When finished, it will simultaneously continue with axis C and D. Finally the acoustic signal disappears and indicates the end of the procedure. Three control LED's located on the stand control unit do indicate the proper termination of balancing. If any of them stays illuminated, the balance must be checked.

Balancing mechanism

It consists of a lever, located between two electrical switches. When the balancing procedure starts, a solenoid engages the lever to the axis and the appropriate brake releases. Now the lever takes over the torque of the axis. Depending of the balancing condition, one of the two switches will be released or – in balanced condition – no switch will be released. In all there are 3 balancing mechanism, one for the axis A and B, one for axis C and one for axis D.

Motorized X/Y movement

Two DC-motors located in the swing carrier allow the movement of the optics carrier. Handgrip keys or footswitch activates the motors. The speed of the movement is adjustable by a potentiometer, located on the stand control unit.

Xenon illumination

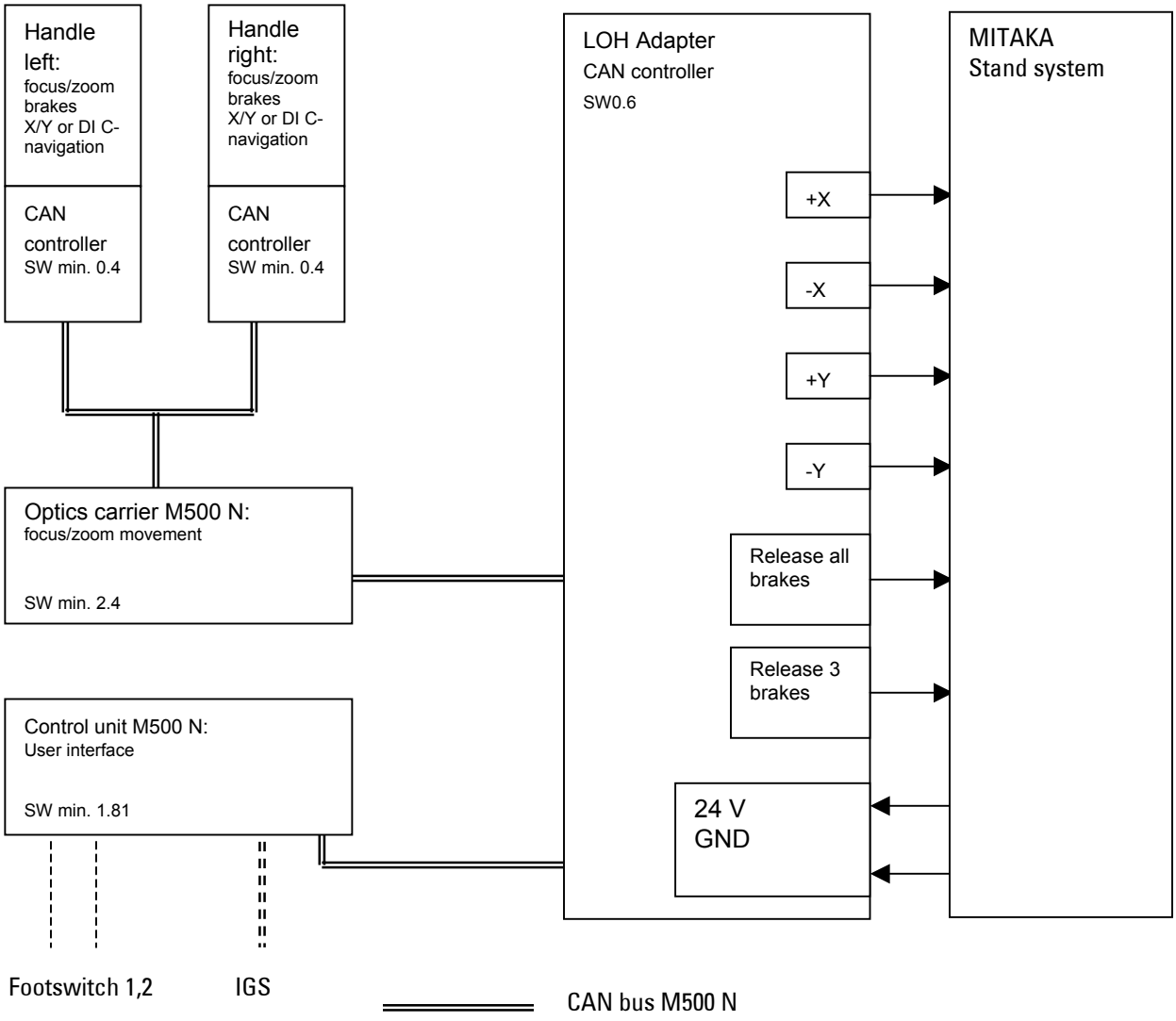
Two complete Xenon light sources are integrated. One Xenon power supply is mounted on the rear side of the column, the other one is located in the illumination control unit. Each of them is equipped with two fans.
The two Xenon bulbs are located in the illumination control unit and can be accessed through a door. Each bulb is equipped with a lifetime indicator. Switches indicate the presence of the bulbs and the condition of the door – open or closed. The active bulb is always cooled; each bulb slot is equipped with a fan.
Each bulb has it's own light path: the light is led over a mirror (with infrared filter function), a condenser lens and a 6-step attenuator to a fibre optics coupling. Both couplings contain a micro switch, which detects whether a fibre optics cable is connected or not.
The ignition of any bulb is only possible when the door is closed and the fibre optics cable is connected. The bulb detection switch must be activated, too. The ignition starts by pressing the illumination button located on the stand control unit. Two LED's nearby do indicate whether the main or the spare bulb is active – or none.
Thermal fuses are located near the Xenon bulbs. They do interrupt the main supply in case of too high temperature.
The intensity control is adjusted with the appropriate attenuator knob on the front panel of the control unit.

Electrical description

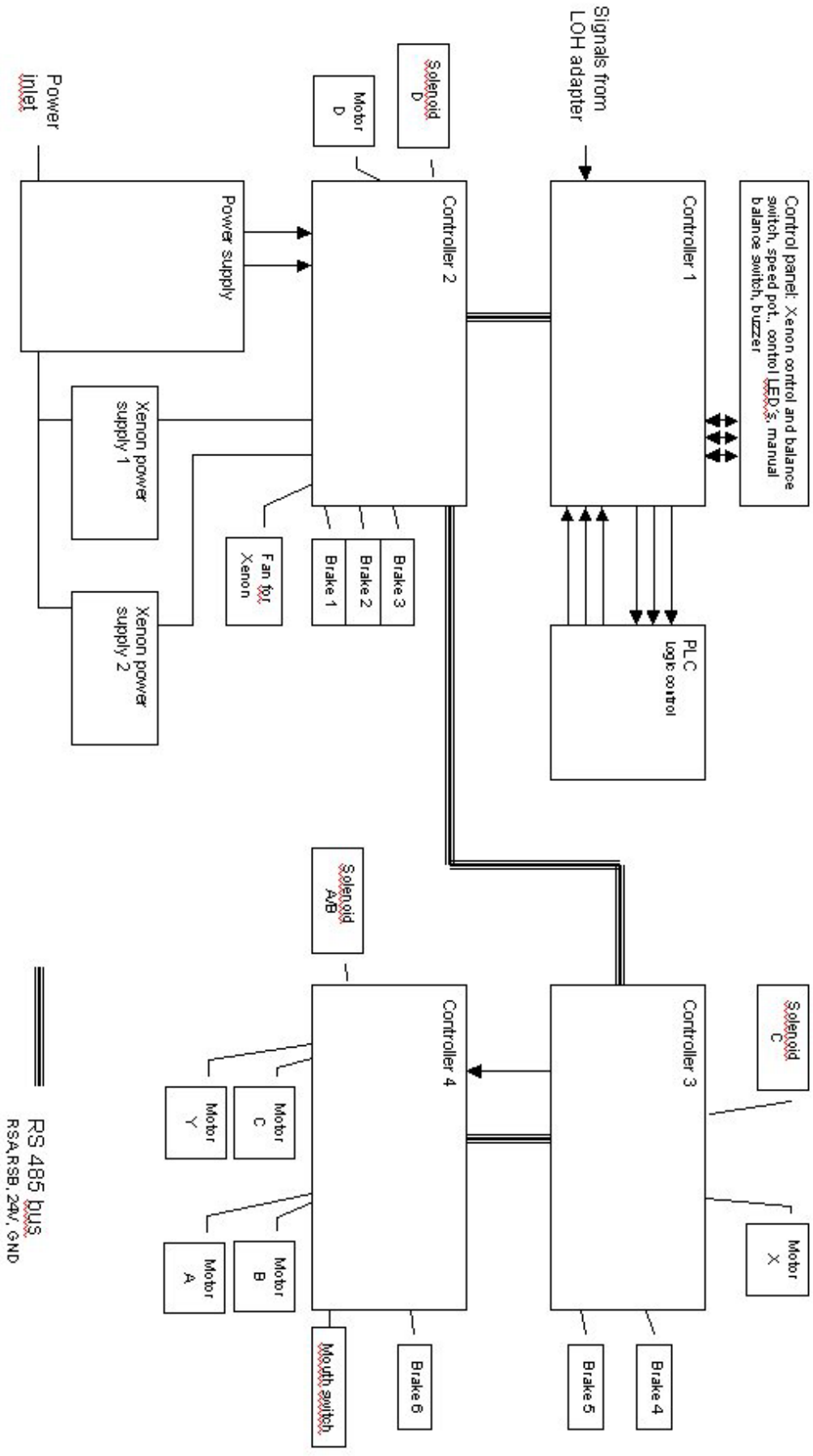
General

The Leica M500 OH3 system consists of 2 different electrical systems. The M500 N microscope system (CAN bus system) on one hand and the Mitaka stand system (RS485 bus system) on the other hand. The two bus systems are switched together at the "LOH-adapter-board". This interface does convert the brake- and X/Y-movement CAN commands, released by handgrip or footswitch, to different TTL-level signals. The signals are interpret on the first microcontroller board of the Mitaka RS485 bus. Commands are sent via the serial bus to the concerning microprocessors – for example to release a brake or to move a axis by a motor.

CAN bus of the M500 N microscope, with the Mitaka OH3 stand:



Block diagram of the Mitaka OH3 stand:



Functional description

Power supply

The mains voltage is released through the power switch to each:

- Xenon power supply (main)
- Xenon power supply (spare)
- Power supply of Mitaka stand (24 V)

24 V supply: Via a filter and a voltage selector the mains voltage is leaded to the transformer. The voltage selector contains two fuses (2x 5A slow for 220-240 V, 2x 10A slow for 100-110V). The transformer delivers 23 VAC to the CD power module, which generates the 24 VDC. The 24 V is distributed to all Mitaka microprocessor boards; a fuse located on the DC power module (10AT) protects the module. In case of a short circuit it will interrupt the 24 VDC. Also the 24 V supplies the microscope system M500 N. It is leaded via LOH adapter, which contains an electronic fuse. In case of a short circuit or an over-current, caused in the microscope system, the fuse will interrupt the voltage supply. After switching off/on the fuse comes back into operation.
5 V supply: Each of the microprocessors does generate it's own 5 V for the logic supply. LED's on each board does indicate the presence of the corresponding voltage.

RS485 bus system

The microprocessors of the Mitaka stand are connected together by the RS485 bus. It is a serial bus system; each processor is able to send and to receive commands. When a command is released, the concerning microprocessor will execute it – for example to release a brake or to read the state of a switch etc. Each microprocessor contains the needed input and output ports (final stages) to the according devices.

Electro magnetically brakes

Non-supplied brakes are permanently kept blocked. By releasing a brake command (by handgrip or mouth switch) the appropriate brake is supplied by 24 VDC. In order to actuate the brakes softly a DC-ramp is applied.

Balancing mechanism

During the auto balancing procedure the torque of each axis needs to be detected: the balancing mechanism for each axis consists of two micro switches, a solenoid and a mechanical lever. During balancing the lever takes over the torque of the axis – activated by a solenoid. Depending on the actual balance condition, the upper or the lower switch will get activated. The state of the switch is read and is interpret by the PLC. It will urge the appropriate motor to move the axis, until the other switch gets active –which happens shortly after the balance point. Then the PLC activates the motor into the opposite direction to reach the balance point.

PLC - industrial programmable control:

The PLC contains the main intelligence and does support several functions, in particular the automatic balancing process. All input and output signals of the PLC are connected to the microprocessor LOH1002, which converts the signals to/from the RS485 bus. All signals are visible on LED's – indicating if active or not – and allow a comfortable diagnosis.

Xenon illumination

The system is equipped with two complete independent Xenon circuits. The bulb housing and one power supply are mounted on the front panel (illumination control unit); the other power supply is underneath of the column. Several fans, all powered by the LOH1002-PCB, are located around the Xenon bulb housing and the power supplies:

- 2 fans for the bulb housing (1 for each bulb)
- 4 fans for the Xenon power supply (2 for each supply)
- 2 fans for column housing

The bulbs are replaced from the front, via a door. Switches detect the presence of a bulb and indicate that the door is closed. Also micro switches detect the presence of a connected fibre optics cable. An ignition can be released only when

- bulb is present
- fibre optics cable is connected
- bulbs door is closed

Temperature sensors are located nearby of the bulbs. They do interrupt the AC supply of the Xenon power supply (in case of an overheat). The sensors switch off at a temperature of 120° Celsius (and need to be replaced, they are not reversible). Temperature sensors inside of the power modules switch off at 90° Celsius; they come back into operation when temperature drops. The fans for the bulbs are equipped with a sense line. A male function would be detected and the corresponding power supply will be shut off.

Control elements

Illumination unit:

Main switch	power on/off of Leica M500 OH3 system
2 regulation knobs	adjusting brightness of main/spare illumination

Stand control unit:

User interface M500 N	controlling the microscope system
Pushbutton illumination	starting/stopping the Xenon illumination
Pushbutton auto-balance	starting the auto-balance procedure
Toggle switch D-balance	balancing D-axis manually
Turning knob speed X/Y	setting of speed for X/Y movement
Selector switch brakes	setting for side switch of handgrip: “XYZ” or “focus lock”

Swing carrier:

Toggle switch C-balance	balancing C-axis manually

A/B slide:

Toggle switch A-balance	balancing A-axis manually
Toggle switch B-balance	balancing B-axis manually

Handgrips:

Rear switch	releasing all brakes
Side switch	releasing 3 brakes
Zoom up/down	operating zoom up/down of M500 N microscope
Focus up/down	operating focus up/down of M500 N microscope
Joystick	operating DI C500-function or moving X,Y

Options:

footswitch	to be connected to the M500 N control unit: user defined function
Mouth switch	releasing 3 brakes

Indication operating state

Illumination unit:

Main switch illumination	
Dark:	switched off condition or no AC power connected or defective fuse
Shines green:	main voltage present at transformer and at the 2 xenon power supplies

Stand control unit:

Pushbutton illumination	
Dark:	illumination not activated
Shines green:	illumination is activated
Flashes orange:	no bulb in the selected slot or door not closed or no fibre optics cable inserted
LED main	
Shines green:	fibre optics connected to main lamp, main bulb inserted and door closed
LED spare	
Shines yellow:	fibre optics connected to spare lamp, spare bulb inserted and door closed
Pushbutton auto-balance	
Flashes orange:	auto-balance in progress
LED A/B	
Shines yellow:	A or B axis at limit
LED C	
Shines yellow:	C axis at limit
LED D	
Shines yellow:	D axis at limit

Buzzer:

Sounds with 1Hz	Auto-balance in progress

08. Wiring diagram / locations - Leica M500 OH3

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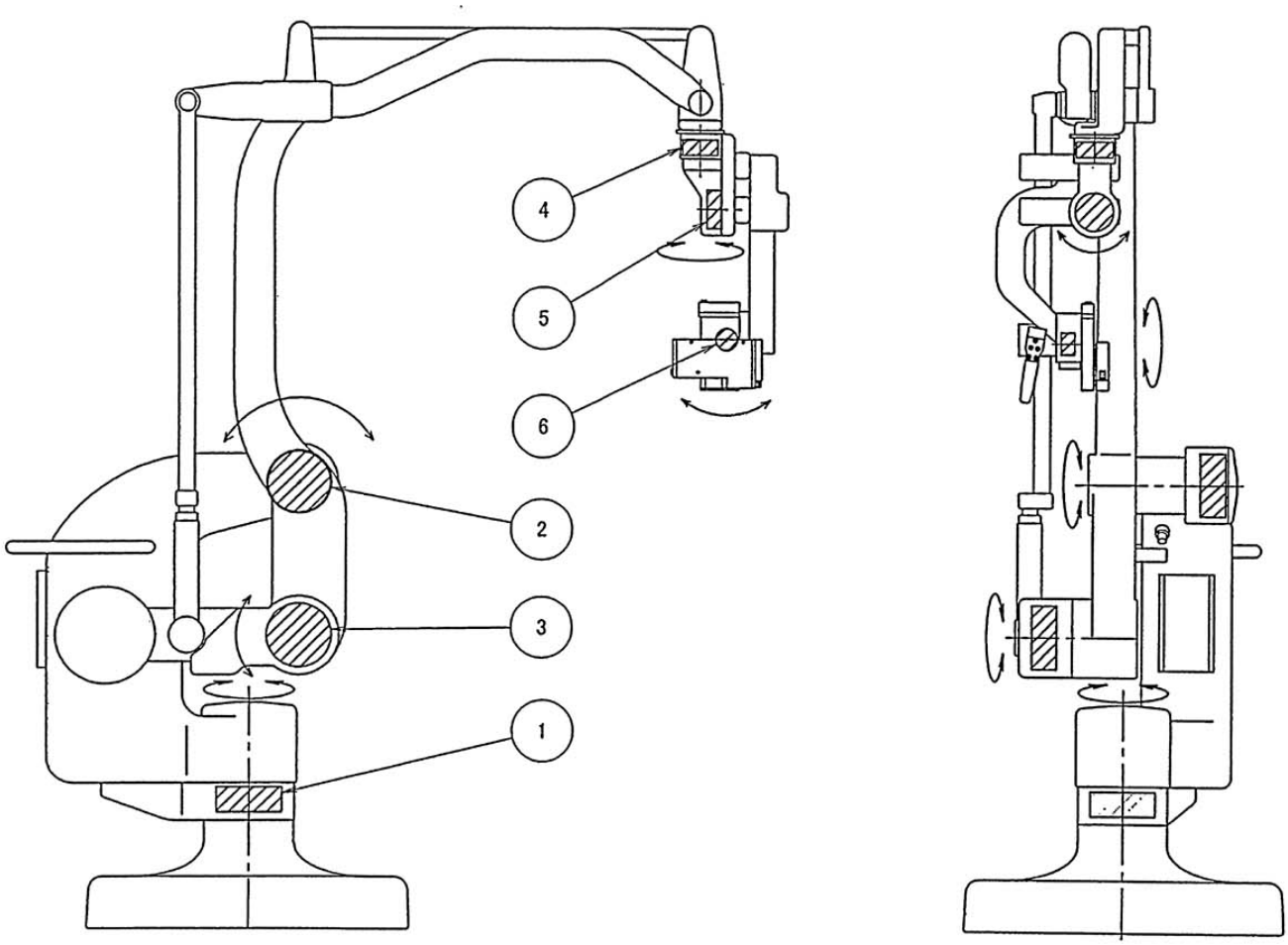
Location of brakes and axis	08-1
Locations of motors, fans and solenoids	08-2
Location of PCB's	08-3
Location of connectors	08-5
Wiring diagram	08-9

Wiring diagram / locations – Leica M500 OH3

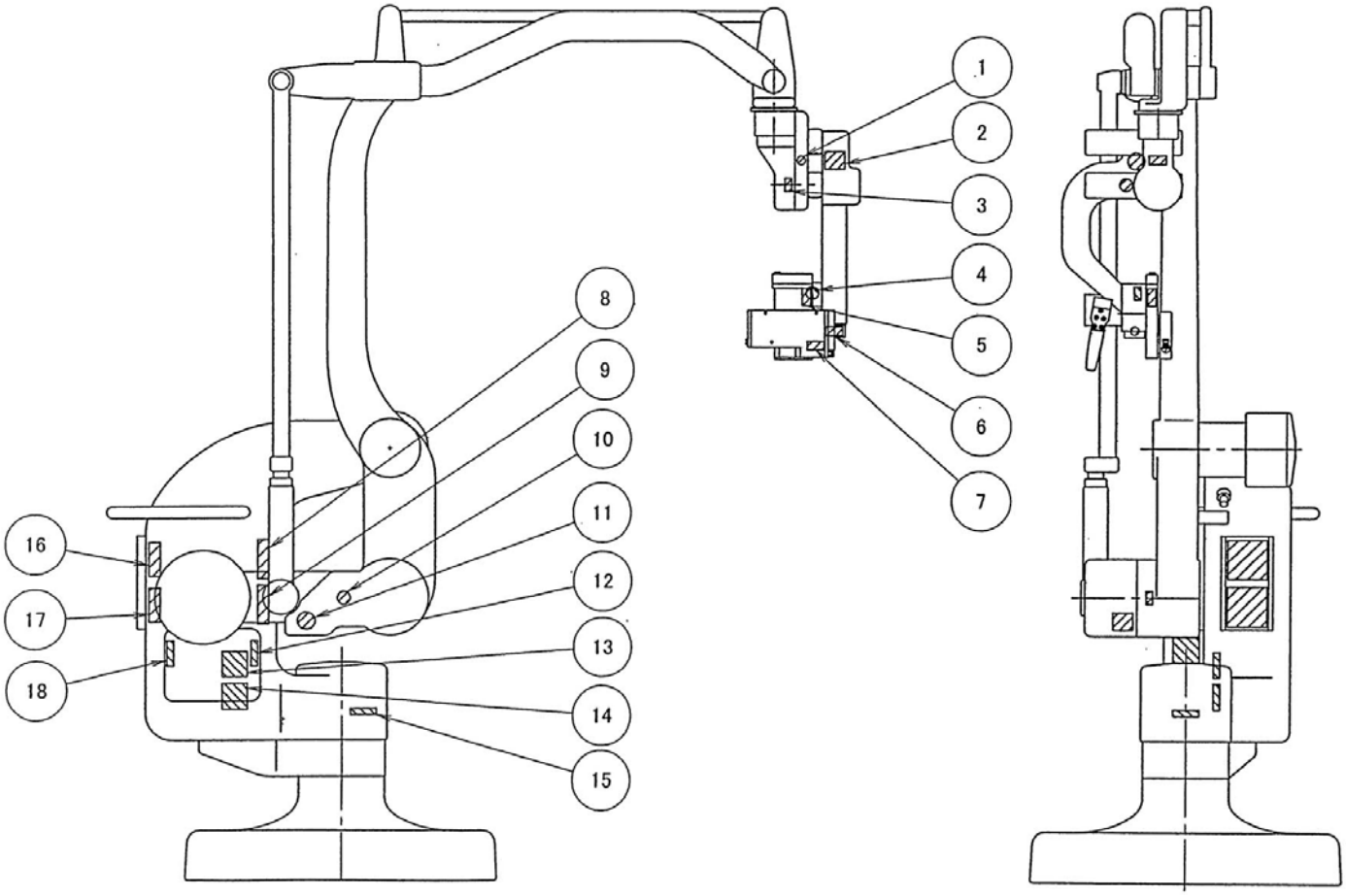
Location of brakes and axis



1 Brake 1 - rotation axis
2 Brake 2 - horizontal axis
3 Brake 3 - vertical axis
4 Brake 4 - pivot axis
5 Brake 5 - tip axis
6 Brake 6 - A/B axis

No.	Axis	Model	Maker
1	1	RNB-5G	OGURA
2	2	RNB-5G	OGURA
3	3	RNB-5G	OGURA
4	4	07.P1.310	KEB
5	5	RNB-0.4G	OGURA
6	6	MCNB5G	OGURA

Location of motors, fans and solenoids

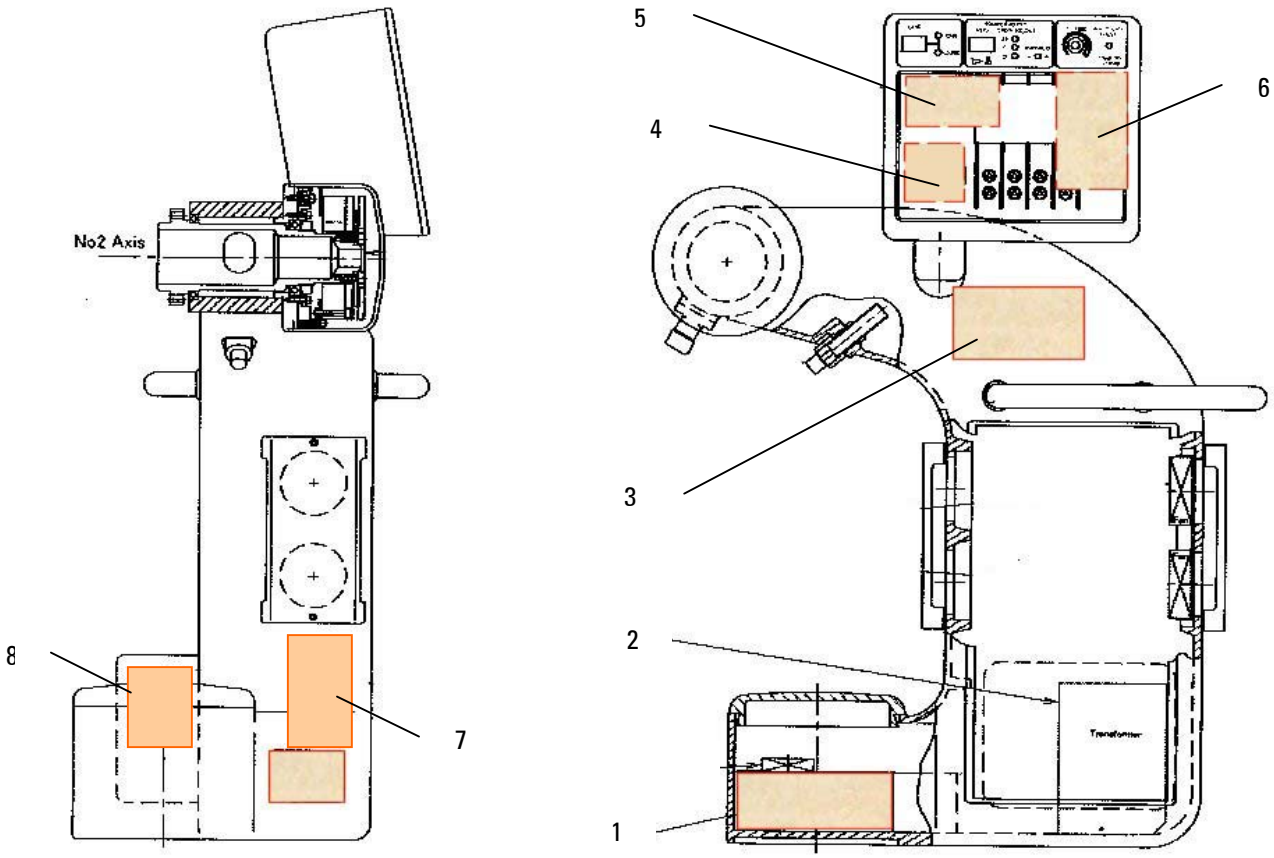


1	X-motor	10	Solenoid D-balance
2	C-motor	11	D-motor
3	Solenoid C-balance	12	Fan 3 (for Xenon power supply)
4	Solenoid A/B balance	13	–"-
5	B-motor	14	–"-
6	Y-motor	15	Fan 2 (for DC power module)
7	A-motor	16	Fan 1 (for housing column)
8	Fan 4 (for Xenon bulb)	17	–"-
9	–"-	18	Fan 3 (for Xenon power supply)

No.	Name	Model	Maker
1	Motor	SCL16G-3504	Sayama
2	Motor	HG37-030-AB-00	Copal
3	Solenoid	3E	Shindengen
4	Solenoid	3E	Shindengen.
5	Motor	LC22G-103	Copal
6	Motor	SCL16G-3504	Sayama
7	Motor	LC22G-103	Copal
8	Fan	MD925A-24L	Oriental motor
9	Fan	MD925A-24L	Oriental motor
10	Solenoid	4E	Shindengen
11	Motor	SS23F	Sawamura
12	Fan	109P0624H702	Sanyo Denki
13	Fan	109P0624H702	Sanyo Denki
14	Fan	109P0624H702	Sanyo Denki
15	Fan	109P0624H702	Sanyo Denki
16	Fan	MD825B-24L	Oriental motor
17	Fan	MD825B-24L	Oriental motor
18	Fan	109P0624H702	Sanyo Denki
19			
20			

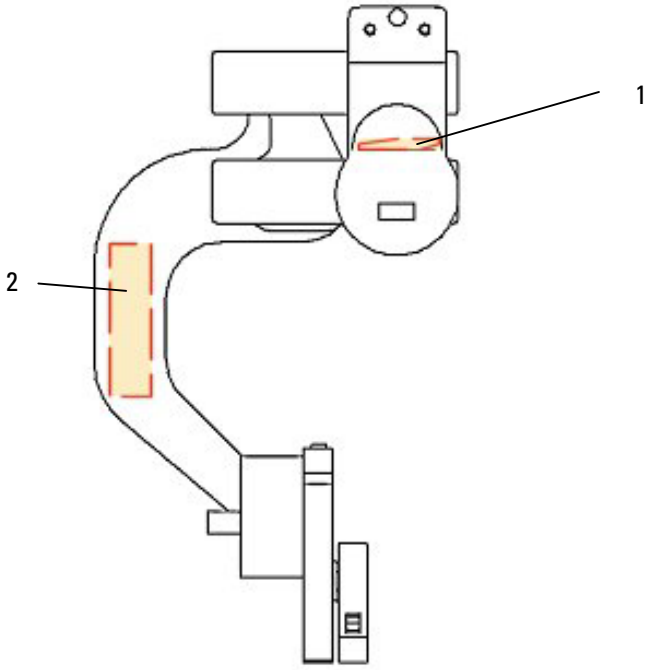
Location of PCB's

PCB's in column and stand control unit



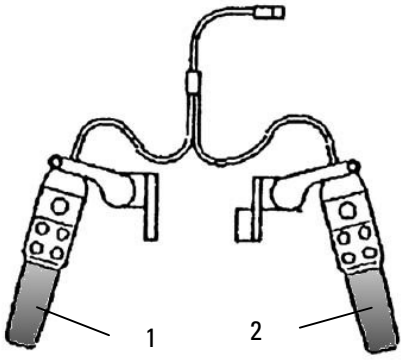
1 DC power supply
2 Transformer
3 PCB LOH1002 (controller 2)
4 PCB LOH-adapter
5 PLC
6 PCB LOH1001 (controller 1)
7 Main Xenon power supply
8 Spare Xenon power supply

PBC's in swing carrier



1 PCB LOH1003 (controller 3)
2 PCB LOH1004 (controller 4)

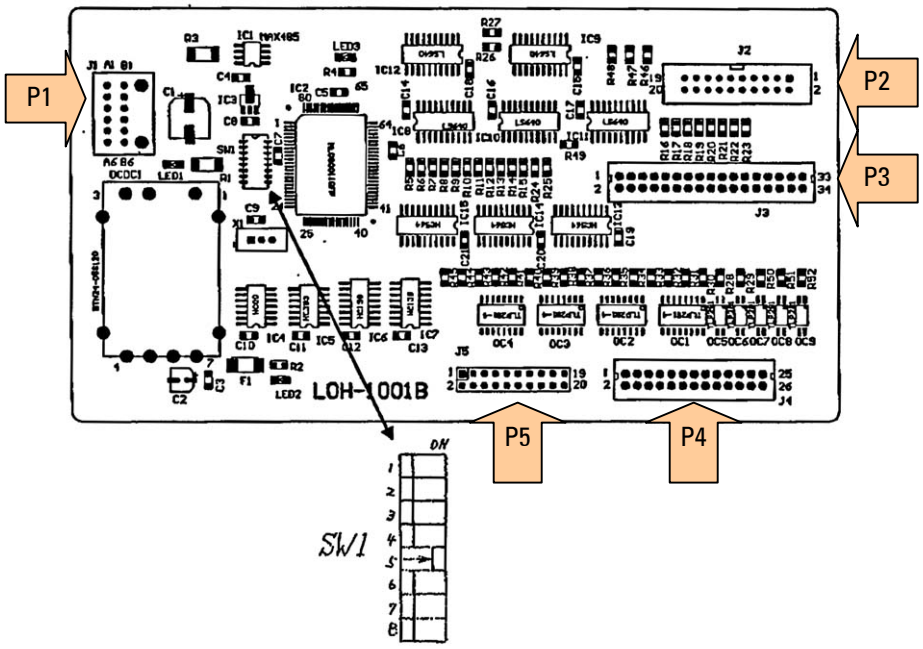
PCB's in handgrip



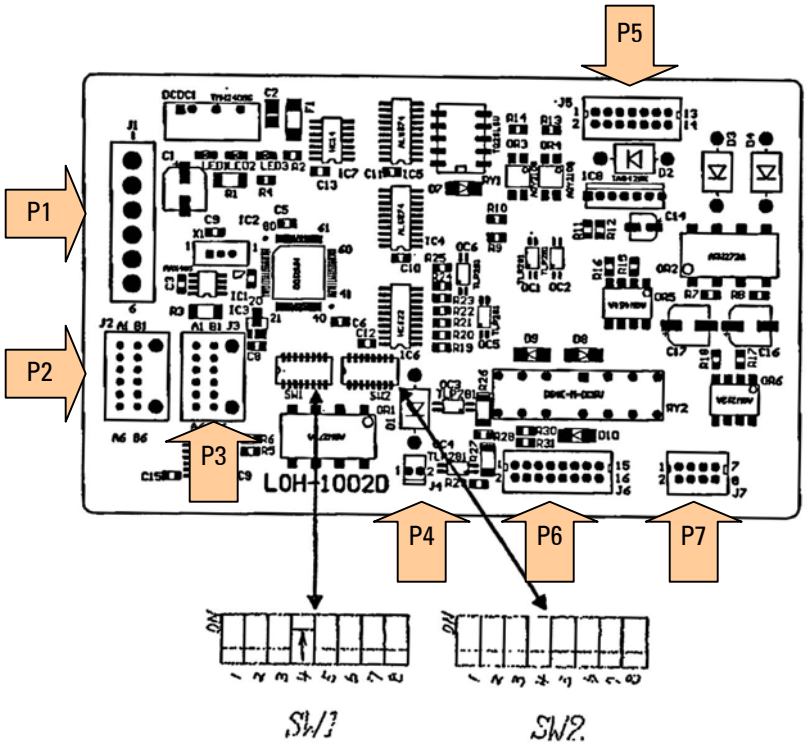
1 CAN controller left
2 CAN controller right

Location of connectors

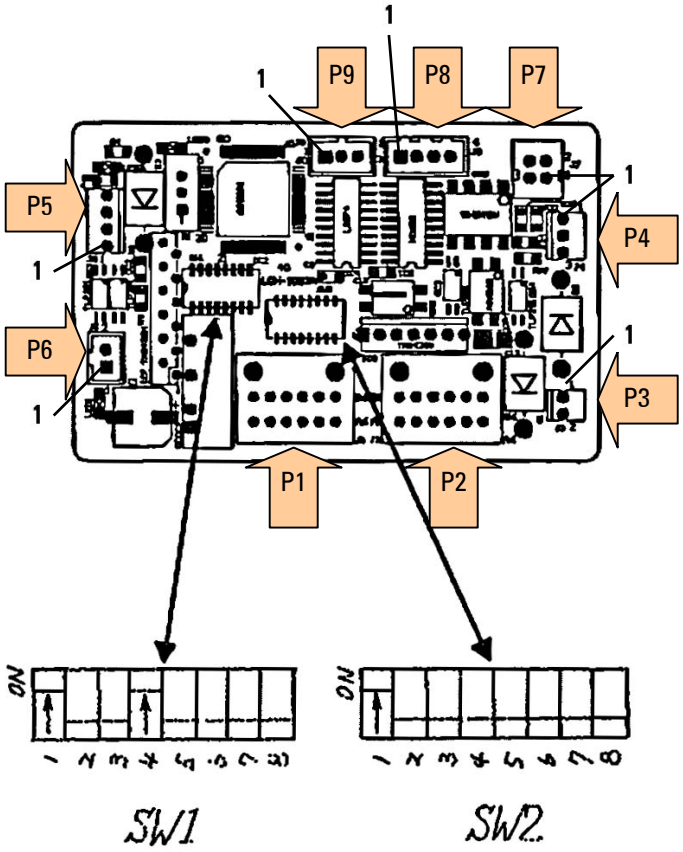
PCB LOH1001



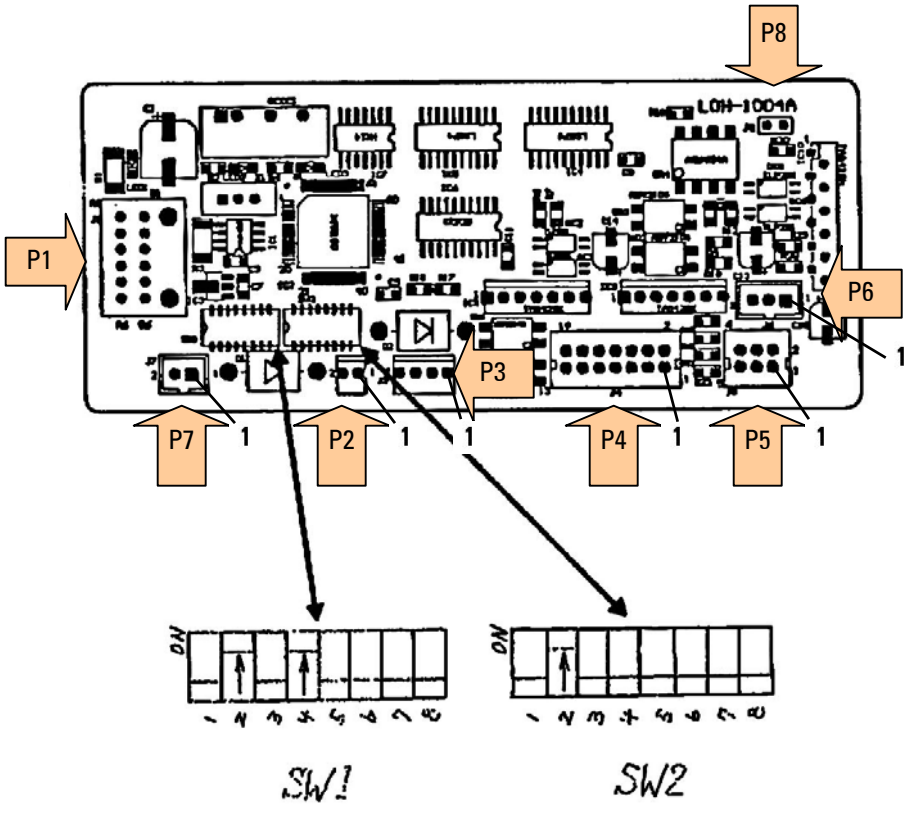
PCB LOH1002



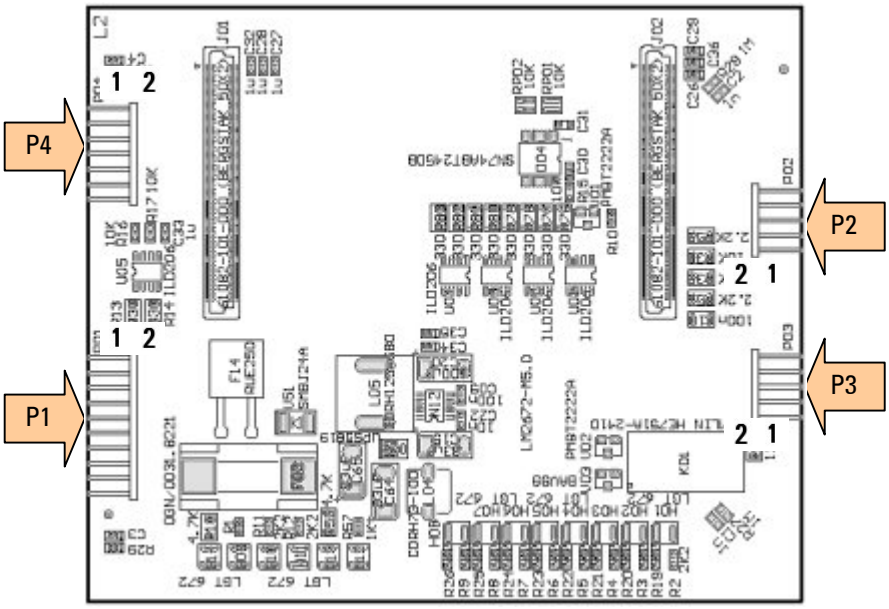
PCB LOH1003



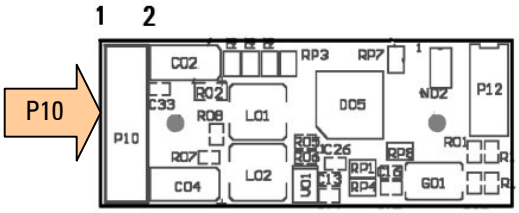
PCB LOH1004



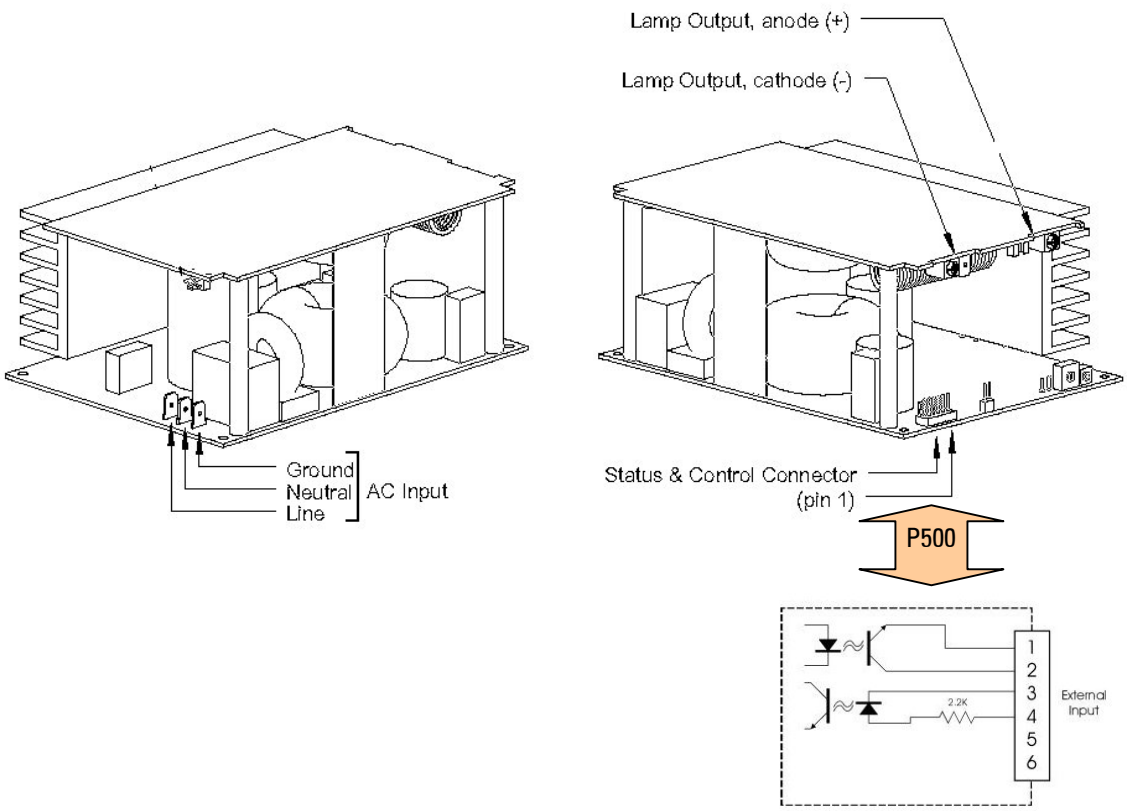
PCB LOH adapter



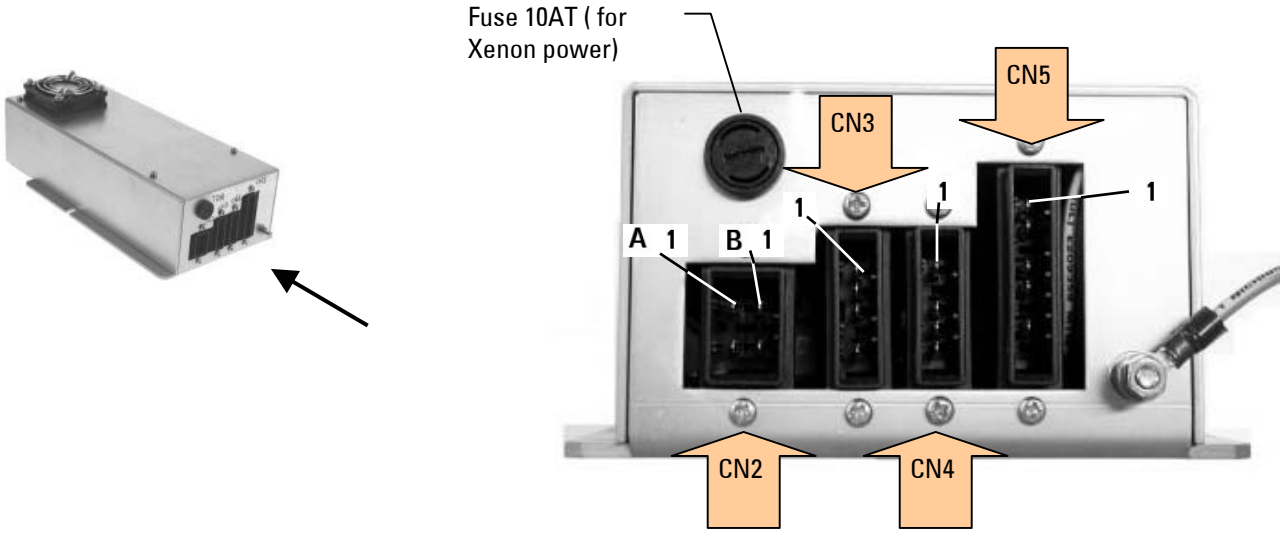
PCB CAN controller left/right



Xenon power module



DC power module



Änderung				
ZCNC	Index	Beschreibung	Datum	Name

CONTROL-UNIT M500N

10711884

10711807

10711809

OH3 ADAPTER

PLC

IN PORT

OUT PORT

PLC Add.

OUT PORT

LOH-1001A

CONTROL PANEL LOH-1005B

STAND CONTROL UNIT OH3

D-AXIS LATCH MODULE

D-SOLENOID

D-AXIS UNIT

D-MOT

MOT LIM

LOH-1002A

LOH-1003A

LOH-1004A

X-MOTOR

C-SOLENOID

C-MOTOR

Y-MOTOR

AB-SOLENOID

A-MOTOR

B-MOTOR

AB-SLIDE MODULE

SWING CARRIER

10711808

4469447 MOUTH SWITCH

SWING ARM

SWING CARRIER

HANDLE LEFT

10712055 HANDEL CONTROLLER LEFT

SWITCHES

10711879

HANDLE RIGHT

10712054 HANDEL CONTROLLER RIGHT

SWITCHES

10711879

10711806

10711881

OPTION DI C500

ENCODER

Zugentlastung 701115

MZ

CAN

CAN-Res.

Service

661250 MOTORCONTROLLER ZOOM/MULTIFOC

oder Fixobjektiv-erkennung + Licht-sensor

OPTICS-CARRIER M500N

661490 SWITCH-BOARD

MULTIFOC-CARRIER

ENCODER

663466

ME

DC POWER MODULE WITH XE-POWER TERMINAL

PCB OH-1000

FAN

SENSOR FAN (MAIN)

SENSOR FAN (SPARE)

POWER SOURCE FOR XENON CE 300 XE MAIN

POWER SOURCE FOR XENON CE 300 XE SPARE

MAIN-SET

SPARE-SET

ERROR

XENON (MAIN)

XENON (SPARE)

THERM. FUSE

TRANSFORMER

AC INLET WITH VOLTAGE SELECTION

POWER SW

MAINS FILTER

LAMP HOUSE UNIT WITH POWER ENTRY

COLUMN

POTENTIAL EQUALIZATION

CLASS OF ACCURACY	PERMISSIBLE TOL. [MM] (UNLESS OTHERWISE SPECIFIED) NOMINAL DIMENSION [MM] ≤ 0.5	>0.5 TO 6	>6 TO 30	>30 TO 120	>120 TO 315	>315 TO 1000	> 1000
I	±10%	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2
II	±40%	±0.2	±0.5	±0.8	±1.2	±2	±3

PERMISSIBLE TOL. [MM] FOR ANGLES PER 100MM NOMINAL LENGTH OF SHORTER LEG (UNLESS OTHERWISE SPECIFIED)	>0.5 TO 10	>10 TO 50	>50 TO 120	> 120
	±1.0	±0.9	±0.6	±0.3
	±2.6	±1.5	±0.7	±0.4

PERMISSIBLE TOL. [MM] FOR RUNOUT AND SYMMETRY (UNLESS OTHERWISE SPECIFIED)	0.5	0.2	0.1
	0.5	0.3	

Corners w/o indic. step hight/thicken	≤2	>2
	0...0.5	+0.2...+0.4 internal
	0.05...0.2	-0.05...-0.1 external

symbol ISO 13715

| | | | |

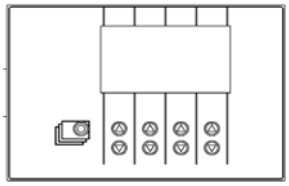
09. Service programs - Leica M500 OH3

Table of content

Chapter	Page
Control unit M500 N	09-1
PLC	09-2
LOH adapter	09-2

Service programs – Leica M500 OH3

Service programs in the control unit M500 N



The SW of the M500 N control unit must be version 1.81 or higher to fit to the OH3 stand.

Detailed description of the M500 N programs: Refer to service manual M500 N (doc code 10665607)

How to enter the service functions:

- Enter the service menu of the M500 N control unit
- Enter security code: 6642
- Select the service functions

Device list

The following devices must be set to “present”:

- Stand
- Microscope M500 N
- Handle R
- Handle L
- Other devices on demand

All other devices must be set to “not present”.

Stand setup

There are no setup functions available. The display just shows the actual stand parameters (LOH adapter only):

SW version: 0.6 or higher
HW version: 1.1 or higher
Device ID: OH3

Diagnostic function

Refer to chapter 10 – fault finding / diagnosis

Software upgrade

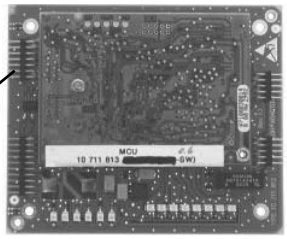
The M500 N control unit allows an SW update by Laptop/PC. Refer to update description (doc code10665668)

Service programs in the stand PLC

2 Service interfaces

Actually there are no service functions available.
A handheld programmer allows SW-upgrade via the service interface.
This tool and the upgrade description is not supplied for field service.

Service programs in the LOH adapter



P4: Service interface

The SW of the LOH adapter must be version 0.6 or higher to fit to the OH3 stand.

This device allows a SW update by PC/Laptop.
Needed for download: data cable, to be connected to service port P4; Lpatop/PC with download program.
This parts and a detailed upgrade description is not supplied for field service.

10. Fault finding - Leica M500 OH3

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Auto balancing	10-3
Manual balancing	10-6
Brakes	10-7
X – Y – movement	10-9
Light source	10-11
Diagnosis LED	10-13
PLC Diagnostic functions	10-16
Diagnosis via M500 N system	10-18

Fault finding – Leica M500 OH3

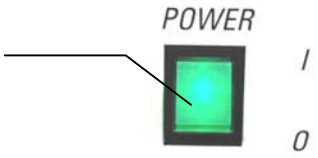
Before starting fault finding, perform the following steps:

Measure	Ensure	Else
Check setting of the main voltage	Setting fits to local main voltage	Select correct voltage
Check setting of 2 main fuses	Setting fits to regulation in assembly manual	Select correct fuses

Power supply

Pay attention to this indicator:

Power switch
Green after switching on
Dark when switched off

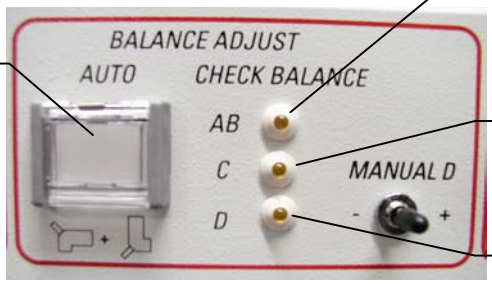


Symptom	Ensure	Else
No power/ power switch not illuminated	2 main fuses ok?	Replace fuses
	Output voltage of mains filter present?	Replace filter
	Main switch in proper condition?	Replace main switch
	Voltage selector ok?	Replace voltage selector
No DC power / M500 N control unit stays dark; power switch is illuminated	AC input of the DC power supply: correct value is app. 23 VAC	Replace transformer
	DCV output of the DC power supply: correct value is app. 24 VDC	Replace DC power supply* * Contains 2 internal fuses; replace fuse only when error cause is clear; fuse F1 for AC input 15A; fuse F2 for DC output 10A
No DC power / M500 N control unit stays dark; power switch is illuminated, fan for DC power supply is running	Connection/cable from DC power supply to PCB LOH1002 ok	Establish proper connection

Auto balancing

Pay attention to this indicators:

Auto balance key
Dark: after system start; after auto balance terminated
Yellow blinking: during auto balance



AB LED
Yellow: A axis has reached rear/front limit **or** B axis has reached upper/lower limit **or** both axis in limit
Else dark

C LED
Yellow: C axis has reached left or right limit
Else dark

D LED
Yellow: D axis has reached rear or front limit
Else dark

Buzzer
Sounds with 1Hz during balance process (except during step "turn microscope 90°")
Else no sound

Symptom	Ensure	Else
Start of auto balance not possible: auto balance key stays dark, no sound	Micro switch for position detection of A/B axis in proper condition: Check signal "A-mode" on input port PLC, refer to page 10-17	Align/replace micro switch Check cable/Connection from switch to PCB "LOH1004" Replace PCB "LOH1004"
	Check signal "ABL SW" on input port of PLC; it must be active while auto balance key is pressed; refer to page 10-16	Check connection/cable from control panel to PCB "LOH1001"; check connection /cable from PCB "LOH1001" to PLC Replace control panel / Xenon switch Replace PCB "LOH1001"

Symptom	Ensure	Else
Procedure does not continue when turned to B-position; auto balance key yellow blinking, buzzer doesn't sound	Micro switch for position detection of A/B axis in proper condition: Check signal "B-mode" on input port PLC, refer to page 10-17	Align/replace micro switch Check cable / connection from switch to PCB Replace PCB "LOH1004"
A or B or both axis not balanced after auto balance procedure;	Motor A can move in both directions; check with fault finding "manual balancing", page 10-6	-
	Motor B can move in both directions; check with fault finding "manual balancing", page 10-6	-
	A/B solenoid activated during balancing process (during step A- and B-balance); check the "AB-solenoid" signal on output port of PLC; refer to page 10-17	Check connection / cable from solenoid to PCB "LOH1004" Measure: Resistance of solenoid is app. 45 Ohm; else replace solenoid / module Measure: Solenoid is supplied by 24 VDC, else replace PCB "LOH1004"
A or B or both axis not balanced after auto balance procedure; AB LED yellow	Balance switches of A/B balance mechanism in proper condition; check the switch signals "AB+" and "AB-" on input port of PLC, refer to page 10-17	Align / replace micro switch Check cable / connection from balance switches to PCB "LOH1004" Replace PCB "LOH1004"
C axis not balanced after auto balance procedure	Motor C can move in both directions; check with fault finding "manual balancing", page 10-6	-

Symptom	Ensure	Else
-"-	C solenoid activated during balancing process (during step C-balance); check the "C-solenoid" signal on output port of PLC; refer to page 10-17	Check connection / cable from solenoid to PCB "LOH1003" Measure: Resistance of solenoid is app. 45 Ohm; else replace solenoid / module Measure: Solenoid is supplied by 24 VDC; else replace PCB "LOH1003"
C axis not balanced after auto balance procedure; C LED yellow	Balance switches of C balance mechanism in proper condition; check the switch signals "C+" and "C-" on input port of PLC, refer to page 10-16, 10-17	Align / replace micro switch Check cable / connection from balance switches to PCB "LOH1003" Replace PCB "LOH1003"
D axis not balanced after auto balance procedure	Motor D can move in both directions; check with fault finding "manual balancing", page 10-6	-
D axis not balanced after auto balance procedure; D LED yellow	Weight discs of D-unit do correlate to the mounted accessories	Add/remove weight discs
	Balance switches of D balance mechanism in proper condition; check the switch signals "D+" and "D-" on input port of PLC, refer to page 10-16	Align / replace micro switch Check cable / connection from balance switches to D-axis module and to PCB "LOH1002" Replace PCB "LOH1002"
D axis not balanced after auto balance procedure; swing arm moves to upper/lower limit during balancing	D solenoid activated during balancing process (during step D-balance); check the "D-solenoid" signal on output port of PLC; refer to page 10-17	Check connection / cable from solenoid to PCB "LOH1002" Measure: Resistance of solenoid is app. 34 Ohm; else replace solenoid / module Measure: Solenoid is supplied by 24 VDC; else replace PCB "LOH1002"

Manual balancing

Symptom	Ensure	Else
All switches for manual balancing do not react: A-, B-, C-, D-balance switch	Auto balance procedure must be terminated; signal “ABL status” on output port of PLC must be inactive, refer to page 10-17	Switch system off and on again
One (or a few) manual balancing switches do not react	Switch and cable / connection from switch to PCB in proper condition	Replace switch / establish proper connection* *Switch path for D manual balancing switch: From panel board to PCB “LOH1001”; via RS485 bus transferred to PCB “LOH1002”
	Motor is supplied when switch is pressed: Motor A: app.+/- 22.6 VDC Motor B: app. –“- Motor C: app. -“- Motor D: app. +/- 23.5 VDC	Check cable and connector to PCB Replace corresponding PCB: Motor A, B: PCB “LOH1004” Motor C: PCB “LOH1003” (contains final stage for motor C; the motor signal is wired through the PCB “LOH1004”) Motor D: PCB “LOH1002”
	Motor in proper condition: measure ohmic resistance: Motor A: app. 70 Ohm Motor B: app. 70 Ohm Motor C: app. 30 Ohm Motor D: app. 10 Ohm	Replace motor or corresponding module

Brakes

Symptom	Ensure	Else
No brake can be released	Auto balance procedure must be terminated; signal “ABL status” on output port of PLC must be inactive, refer to page 10-17	Switch system off and on again
	Check handgrip function in diagnosis program of M500 N control unit: function ok? Refer to M500 N diagnosis, page 10-18	Check the CAN bus cable from handgrip Check CAN bus cable from optics carrier to control unit M500 N Replace handgrip
	Brake release command from handgrip is active on LOH adapter’s output? Refer to diagnosis LED’s on page 10-15	Check CAN bus cable from control unit M500 N to PCB “LOH-adapter” Replace PCB “LOH-adapter”
	Brake release signal active on input port of PLC? Check diagnosis LED’s, refer to page 10-16 (Signal “brake all” for rear button, signal “brake partial” for side button of handgrip)	Check the cable connection from PCB “OH3-adapter” to PCB “LOH1001” (connector P5) Check the cable connection from PCB “LOH1001” (connector P4) to PLC Replace PCB “LOH1001” Replace PLC
	Brake release signal active on output port of PLC? Check diagnosis LED’s, refer to page 10-17	Replace PLC
	Proper connection between PLC and PCB “LOH1001” (P3)?	Establish proper connection
	Proper connection of RS485 bus between PCB “LOH1001”(P1) and PCB “LOH1002”(P3)?	Establish proper connection

Symptom	Ensure	Else
One (or a few) brakes do not release	Ohmic resistance of brake: Brake 1: app. 15 Ohm Brake 2: -"- Brake 3: -"- Brake 4: app. 25 Ohm Brake 5: app. 45 Ohm Brake 6: app. 90 Ohm	Replace brake
	Ohmic resistance against ground: Must be higher than 10 M Ω	Replace brake; the appropriate PCB might be damaged, too.
	Output port of PLC: Signal of brake on active state? Check diagnosis LED's, refer to page 10-17	Replace PLC
	Brake is supplied by 24 VDC	Check cable and connector to PCB
		Replace appropriate PCB: Brake 1, 2, 3: PCB "LOH1002" Brake 4, 5: PCB "LOH1003" Brake 6: PCB "LOH1004"

X - Y - movement

Symptom	Ensure	Else
X-Y-movement does not work at all	Actual user setting allows this function	Set X-Y-function in user menu of M500 N
	Check handgrip function in diagnosis program of M500 N control unit: X-Y - function ok? Refer to M500 N diagnosis, page 10-18	Check the CAN bus cable from handgrip Check CAN bus cable from optics carrier to control unit M500 N Replace handgrip
	X or Y command from handgrip is active on LOH adapter's output: refer to diagnosis LED's on page 10-15	Check CAN bus cable from control unit M500 N to PCB "LOH-adapter" Replace PCB "LOH-adapter"
	Proper cable connection from PCB "OH3-adapter" to PCB "LOH1001" (connector P5)	Establish proper connection
	Function of PCB "LOH1001" ok? (Check diagnosis LED's, refer to page 10-13)	Replace PCB "LOH1001"
	RS485 bus connection/cable ok? Check cable/connection: PCB "LOH1001" to PCB "LOH1002" PCB "LOH1002" to PCB "LOH1003" PCB "LOH1003" to PCB "LOH1004"	Establish proper connection
Movement of one axis (X or Y) does not work	X and Y commands from handgrip are active on LOH adapter's output: refer to diagnosis LED's on page 10-15	Check handgrip in diagnosis program Replace PCB "LOH-adapter"
	RS485 bus connection/cable ok? Check cable/connection: PCB "LOH1001" to PCB "LOH1002" PCB "LOH1002" to PCB "LOH1003" PCB "LOH1003" to PCB "LOH1004"	Establish proper connection

Symptom	Ensure	Else
-"-	Ohmic resistance of motor: Motor X: app. 40 Ohm Motor Y: app. 40 Ohm	Replace swing carrier* *or swing carrier module; refer to spare part list
	Ohmic resistance against ground: Must be higher than 10 M Ω	Replace swing carrier*; the appropriate PCB might be damaged, too.

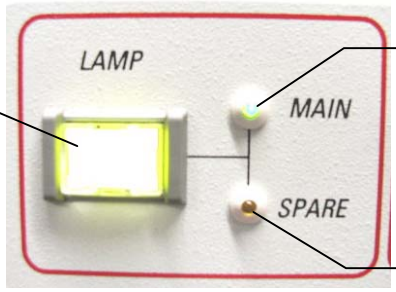
Light source

WARNING! Never look directly into the light source!

WARNING! High voltage around Xenon power supplies and Xenon bulb housing!

Pay attention to this indicators:

Ignition key
Dark: after system start
Green: after ignition
Yellow blinking: failure



Main LED
Green: main bulb inserted and door closed and fibre connected to main outlet
Else dark

Spare LED
Yellow: spare bulb inserted and door closed and fibre connected to spare outlet
Else dark

Symptom	Ensure	Else
Ignition of both bulbs not possible; ignition key green after activation	Bulbs in proper condition;	Replace bulbs
	Check fuse for AC input of Xenon power supply: located on the DC power supply	Replace fuse: T10A
Ignition of both bulbs not possible; ignition key yellow blinking; main LED and spare LED dark	Micro switches for bulb door, bulbs and fibre optics detection in good working order: Check signal “Main fibre” and “spare fibre” on input port of PLC; refer to page 10-17	Replace / re-align switches Replace PCB “LOH1002”
	Check signal “XE.SW” on input port of PLC; it must be active while ignition key is pressed; refer to page 10-17	Check connection/cable from control panel to PCB “LOH1001”; check connection /cable from PCB “LOH1001” to PLC Replace control panel / Xenon switch Replace PCB “LOH1001”

Symptom	Ensure	Else
Ignition of one bulb not possible; ignition key yellow blinking; main LED and spare LED dark	Micro switches for bulb door, bulbs and fibre optics detection in good working order: Check signal “Main fibre” or“ spare fibre” on input port of PLC; refer to page 10-17	Replace / re-align switches Replace PCB “LOH1002”
Ignition of one bulb not possible; ignition key yellow blinking; corresponding LED (main LED or spare LED) illuminated	The bulb fan (Fan4) must run; check signal “Main fan alarm” or “Spare fan alarm” on input port of PLC; it must be active after ignition key is pressed; refer to page 10-17	Check/replace fan4; Check supply voltage of fan; must be 24VDC, else replace PCB “LOH1002”
Ignition of one bulb not possible; ignition key green; corresponding LED (main LED or spare LED) illuminated	Xenon power supply in good working order	Replace Xenon power supply
	Check condition of thermal fuse: measure ohmic resistance: < 1 Ohm when temperature below 100°C	Replace thermal fuse
	Output port of PLC: check Signal “Main Xenon cont.” or “Spare Xenon cont.” on active state? (Check diagnosis LED’s, refer to page 10-17)	Replace PLC
	Enable signal reaches Xenon power supply; it must be 24 VDC when active	Check cable / connection from PCB “LOH1002” to Xenon power supply Replace PCB “LOH1002”

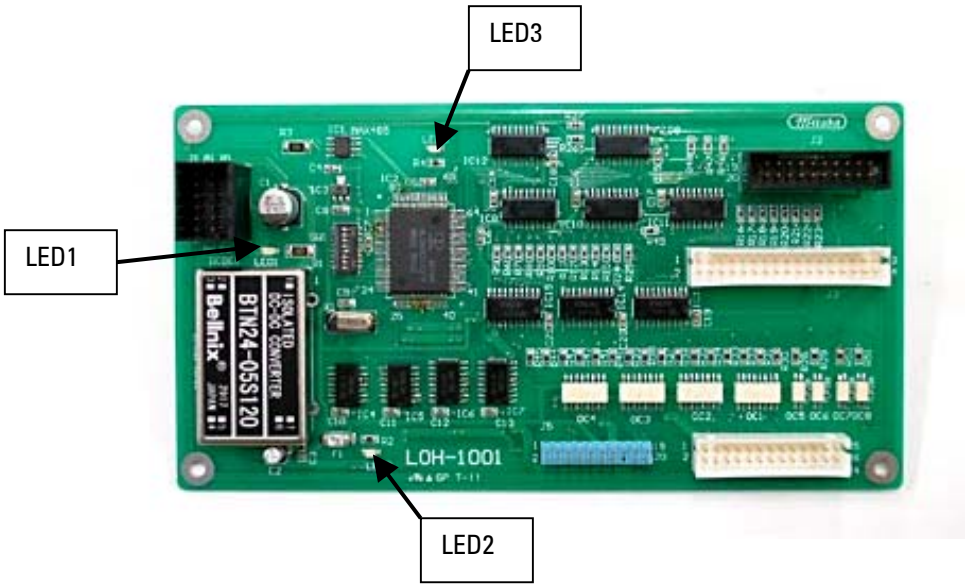
Diagnosis LED's

LED's on the 4 Mitaka controller boards

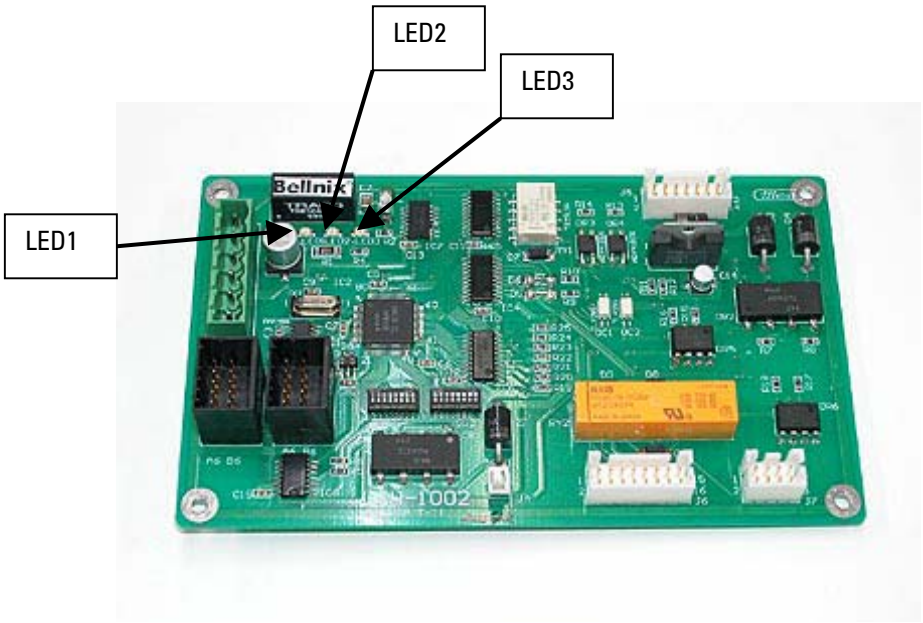
Each of the 4 Mitaka controller boards is equipped with 3 LED's.

LED	*Function indicated*	*how*
LED1	24V available	green
LED2	5V available	green
LED3	Processor runs	green blinking 1Hz

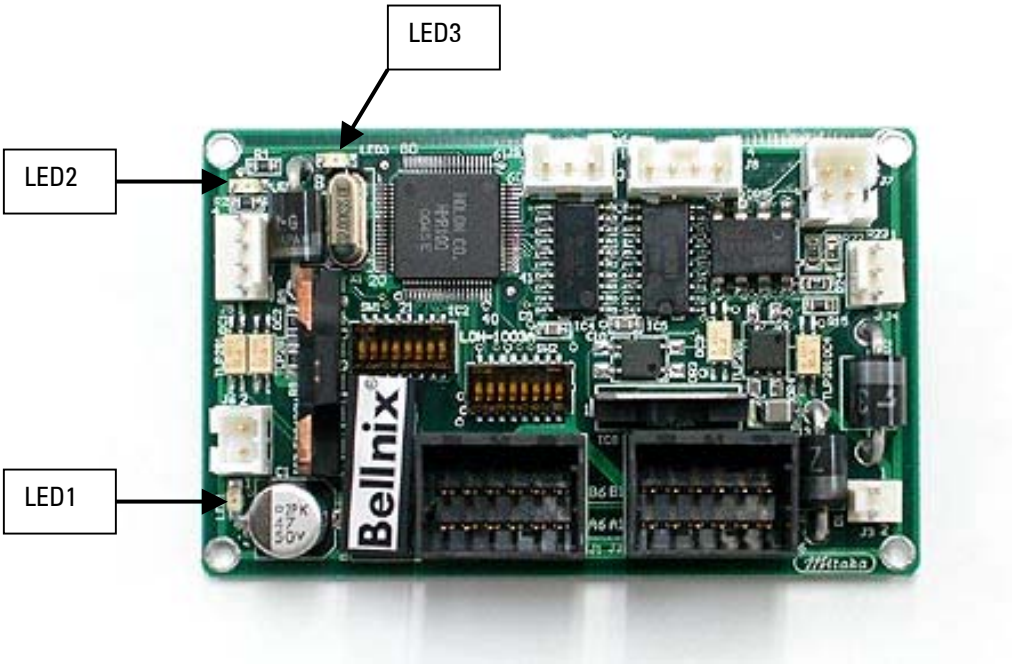
Controller 1: PCB LOH-1001



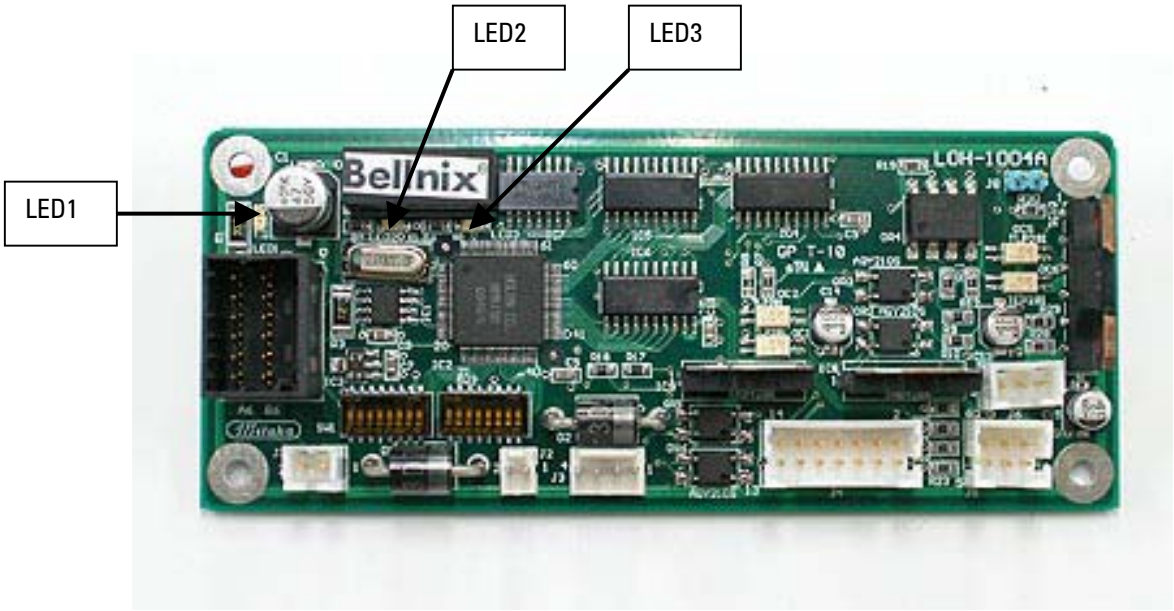
Controller 2: PCB LOH-1002



Controller 3: PCB LOH-1003



Controller 4: PCB LOH-1004

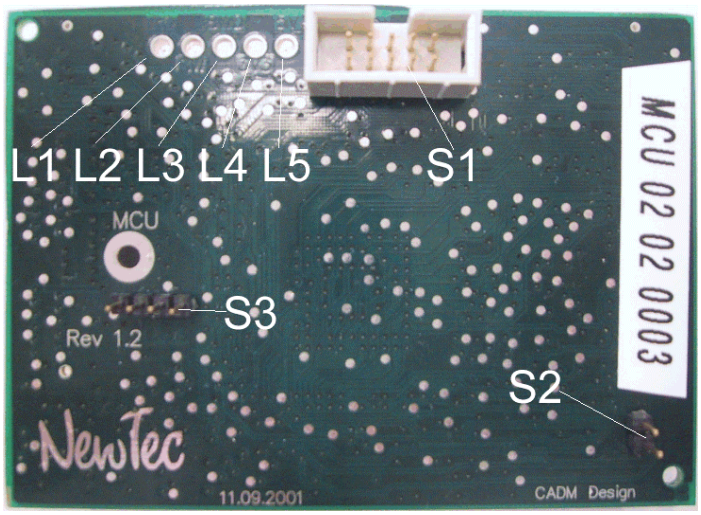


LED's on the LOH adapter

The LOH adapter consists of the adapter board itself and the processor board. Both do contain several LED's.

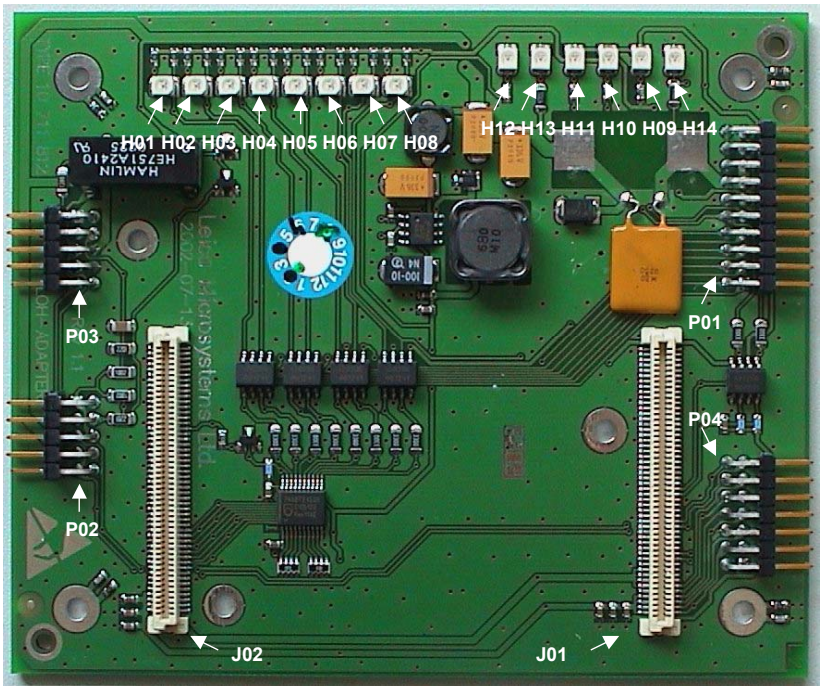
Processor board:

LED	*Function indicated*	*how*
L1	Interrupt LED indicates an interrupt is activated. If the LED lits continuously, the program is disturbed during normal operation	red off
L2	Program runs	green blinking app. 1Hz
L3	Outputs (brakes, motors) disabled during normal operation	green off
L4	3.3V available	green
L5	5V available	yellow



Adapter board:

LED	*Function indicated*	*how*
H01	key +X pressed	green
H02	key –X pressed	green
H03	key +Y pressed	green
H04	key –Y pressed	green
H05	key partial brake pressed	green
H06	key all brakes pressed	green
H07	reserved	
H08	reserved	
H09	5V from stand available	green
H10	reserved	
H11	reserved	
H12	5V available	green
H13	24V for CAN available	green
H14	24V from stand available	green

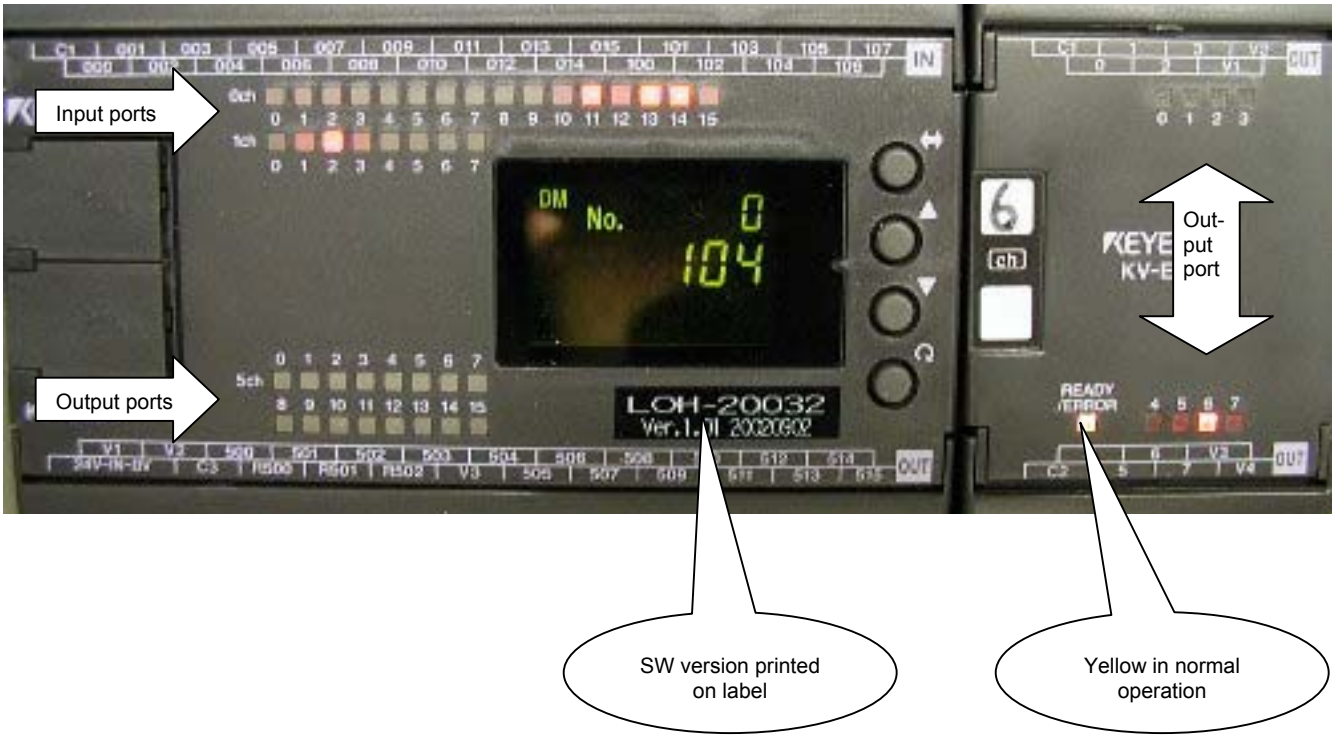


Electronic fuse for 24V: max. 2.5 A

PLC diagnostic function

General

The PLC is equipped with several LED's, which do indicate an active (illuminated) or inactive (not illuminated) condition of the appropriate input or output signal.
The display shows the actual SW version during normal operation.
(SW versions earlier than 1.04 showed different information: SYS Pro9 was shown in the display)



LED's and the corresponding signals

Input ports:

PORT	Signal	Task	Released by
000	Brake partial	Releases 3 brakes	Side switch of handgrip
001	Brake all	Releases all brakes	Rear switch of handgrip
002	ABL SW	Starts auto balance procedure	Auto balance pushbutton
003	D+	Indication: upper balance switch of D activated	Balance mechanism D: upper switch
004	D-	Indication: lower balance switch of D activated	Balance mechanism D: lower switch
005	C+	Indication: lower balance switch of C activated	Balance mechanism C: lower switch

006	C-	Indication: upper balance switch of C activated	Balance mechanism C: upper switch
007	AB+	Indication: + balance switch of A/B activated	Balance mechanism A/B: + switch
008	AB-	Indication: - balance switch of A/B activated	Balance mechanism A/B: - switch
009	Xe. SW	Ignites Xenon illumination	Lamp pushbutton
010	Main fan alarm	Indication: main bulb fan is running	Main bulb fan
011	Spare fan alarm	Indication: spare bulb fan is running	Spare bulb fan
012	Main fibre	Indicates presence of fibre on main light outlet AND main bulb inserted AND bulb door closed	Main light outlet AND main bulb AND door switch
013	Spare fibre	Indicates presence of fibre on spare light outlet AND spare bulb inserted AND bulb door closed	Spare light outlet AND spare bulb AND door switch
014	Focus lock	Indicates the state of the brake selection switch	Brake selector switch
015	D-limit	Indication: Limit (left or right) reached in D-axis	D-limit switches
100	C-limit	Indication: Limit (left or right) reached in C-axis	C-limit switches
101	AB-limit	Indication: Limit reached in A and/or B-axis	A and/or B-limit switches
102	A-mode	Indication: microscope carrier in A-position	A-position switch
103	B-mode	Indication: microscope carrier in B-position	B-position switch
104	NC		
105	NC		
106	NC		
107	NC		

Output ports:

PORT	Signal	Task	Target
500	Brake 1,2	Releases brake1 and 2	Brake1 and 2
501	Brake 3	Releases brake 3	Brake 3
502	Brake 4	Releases brake 4	Brake 4
503	Brake 5	Releases brake 5	Brake 5
504	Brake 6	Releases brake 6	Brake 6
505	D-solenoid	Activates D-solenoid	D-solenoid
506	C-solenoid	Activates C-solenoid	C-solenoid
507	AB-solenoid	Activates AB-solenoid	A/B-solenoid
508	D-motor +	Activates D-motor in + direction during balancing	D-motor
509	D-motor -	Activates D-motor in - direction during balancing	D-motor
510	AB-motor +	Activates A or B-motor in + direction	A or B motor
511	AB-motor -	Activates A or B-motor in - direction	A or B motor
512	AB-motor change	Assigns motor A or motor B to the final stage	PCB LOH1004
513	C-motor +	Activates C-motor in + direction	C motor
514	C-motor -	Activates C-motor in - direction	C motor
515	Balance go	Acitvates green illumination of autobalance pushbutton*	Auto balance pushbutton
		*Signal removed with SW version 1.04 or higher	
600	Balance NG	Activates yellow blinking of auto balance pushbutton	Auto balance pushbutton
601	Main Xenon cont.	Enables main Xenon power supply	Main Xenon power supply
602	Spare Xenon cont.	Enables spare Xenon power supply	Spare Xenon power supply
603	Xenon on monitor	Activates green illumination of lamp pushbutton	Lamp pushbutton
604	Xenon alarm monitor	Activates yellow blinking of lamp pushbutton	Lamp pushbutton
605	ABL status	Auto balance is in progress	
606	Lamp fan rly.	Spare bulb fan is selected	PCB LOH1002
607	Buzzer	Activates acoustic signal; frequency 1Hz	Buzzer on panel board

Diagnosis via the M500 N system

Diagnostic function

The diagnose software in the M500 N service program allows to:

- Check the can handle switches: in menu “check CAN handle switches” each activated knob of the handgrip is displayed on the control unit. Left and right handgrip can be checked separately.
- Ask for SW versions and state of all connected controllers: the menu “show parameter” for each CAN controller shows parameter like actual SW and HW version
- Display actual errors: actual errors are shown in the display of the M500 N control unit (some are visible only if the service program is entered).
- Watch error list: All errors appearing in the M500 N CAN bus system are stored. In menu “show/clear error list” all actual and earlier errors are shown. They are displayed on the control unit. Until the error list is cleared, all errors keep stored in the memory.

After servicing always clear the error list!

How to enter the diagnostic program:

- Enter the service menu of the M500 N control unit
- Enter security code: 6642
- Enter the diagnostic function

11. Replacing modules – Leica M500 OH3

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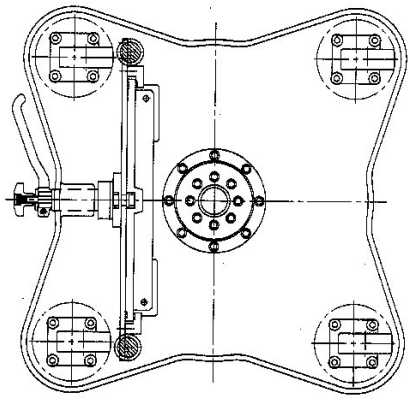
Replacing modules – Leica M500 OH3

Overview

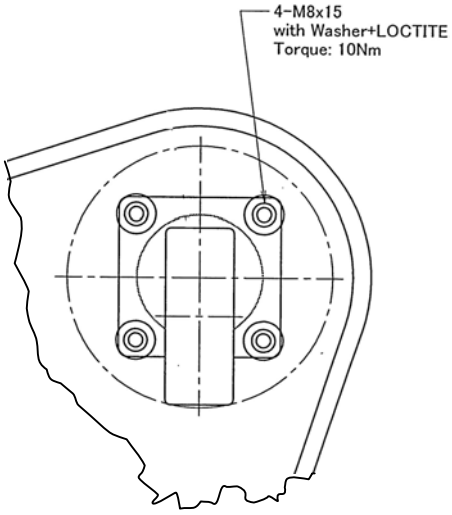
Find a summarizing sheet with specification of modules, screws and torques in section 14/spare parts.



Base

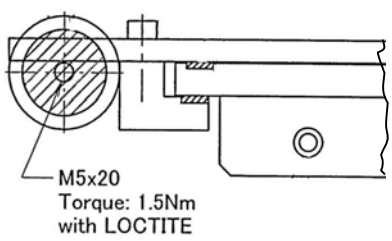
Replacing base –complete part

Actually no replacement possible. Complete stand must be replaced.



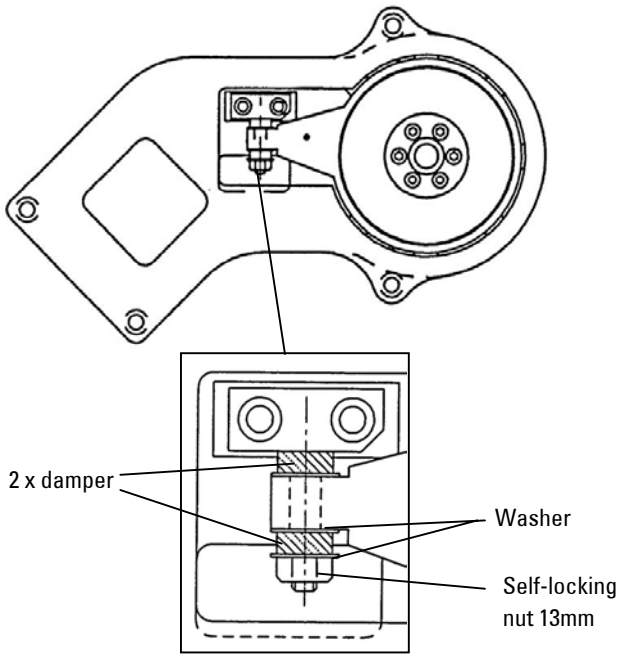
Replacing castor

1. Lock system
2. Remove optics carrier and remove swing carrier
3. Tilt stand with other person
4. Loosen 4 allen screws M8x15 of castor
5. Mount new castor; torque 10Nm, secure screw with Loctite 221



Replacing rubber pad

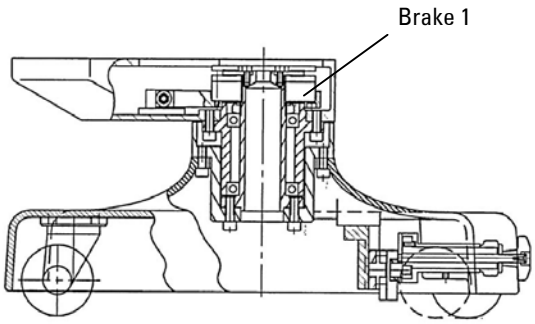
1. Lock stand
2. Remove optics carrier and swing carrier
3. Tilt stand with other person
4. Loosen Allen screws M5x20
5. Mount new rubber pad, secure srew with Loctite 221



Replacing damper

Only 1 damper can be replaced!

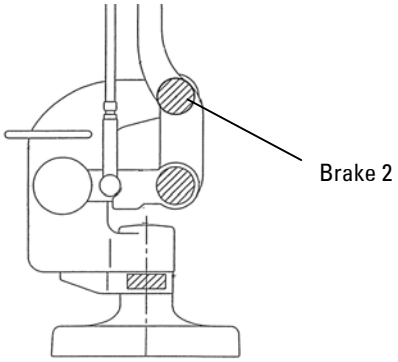
1. Balance system
2. Access the nut from bottom side
3. Loosen nut with 13mm ring spanner
4. Release damper
5. Mount new damper; washers according to drawing
6. ADJUSTMENT of damper: Tighten nut moderate until free play of axis is gone; tighten further for ½ to 1 full turn; check fibration, refer to inspection section 13;



Replacing brake 1

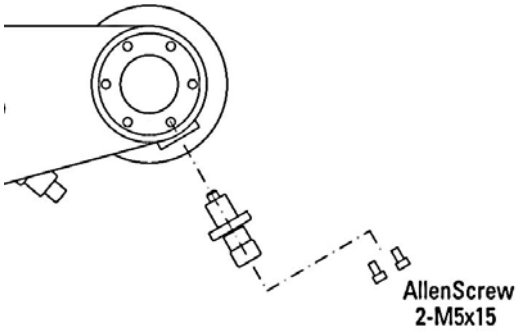
Actually no replacement possible. Complete stand must be replaced.

Column



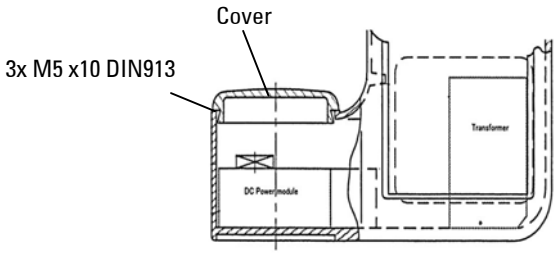
Replacing brake 2

Actually no replacement possible. Complete stand must be replaced.



Replacing lock for brake 2

1. Balance system before proceeding
2. Move swing arm to rear end position
3. Loosen 2 allen screws M5x15
4. Remove lock
5. Insert new lock, red dot to front; tighten screws

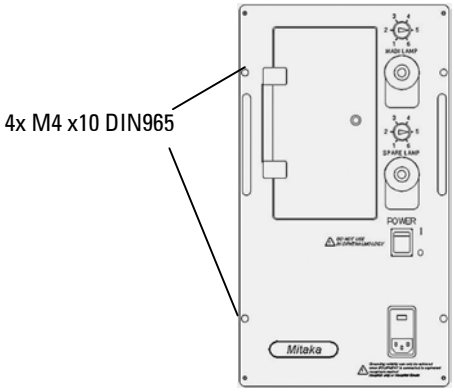


Replacing DC power module

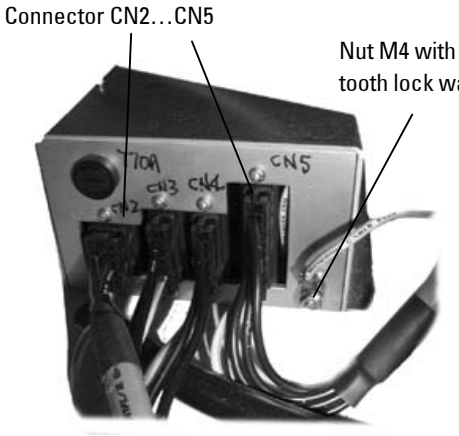
1. Disconnect main power

2. Open cover of column: slacken 3 Allen screws

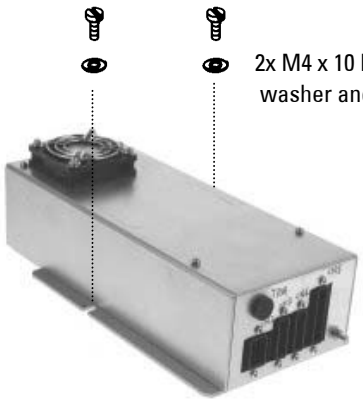
3. Access to inner side of column: Loosen 4 Phillips screws and swing out control unit with light house



Easier access: Hang out control unit completely and put it on a support (chair).

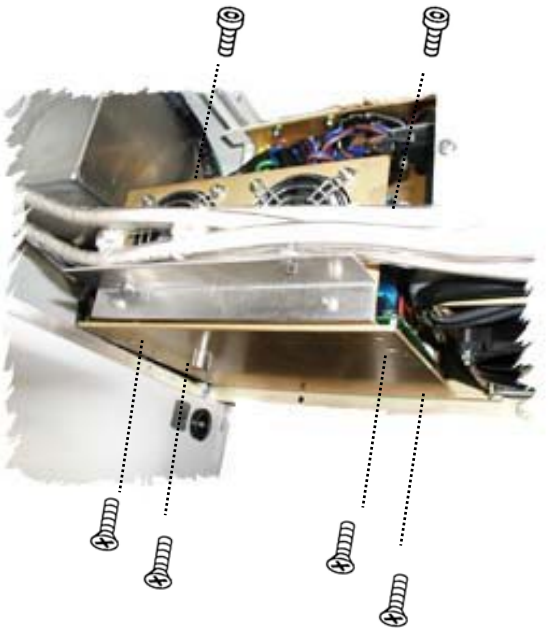


4. Disconnect 4 plugs and earth wire (nut and washer) of power supply



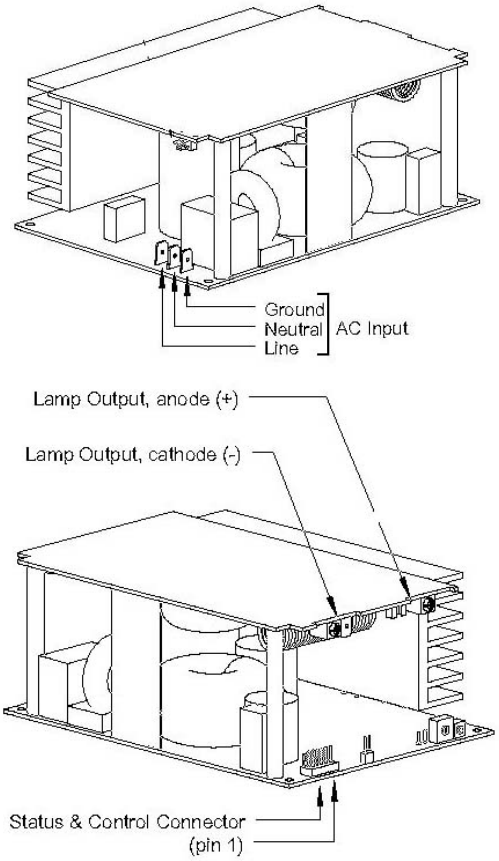
5. Loosen 2 Phillips screws and remove DC power module

Replacing main Xenon power supply

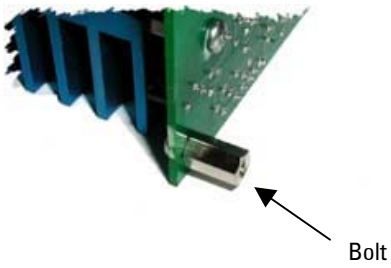


1. Disconnect main power

2. Access to inner side of column: Loosen 4 Phillips screws and swing out control unit with light house.
3. Hang out control unit completely and put it on a support (chair)
4. Loosen fan assembly (2 Allen screw M4x6), disconnect plugs to fans
5. Loosen Xenon power supply (4 Phillips screws M3x6)

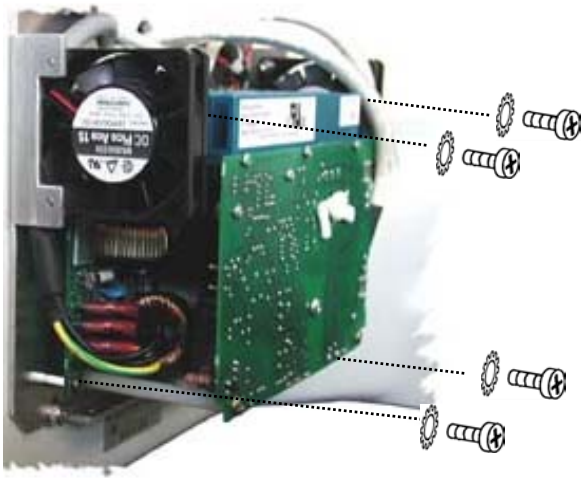


6. Disconnect main-, lamp output- and sense cable



7. Remove unit; take over 4 mounting bolts for the replacement module (Phillips screw M3x5, 10mm bolt)
8. Assembly: proceed in reversed order

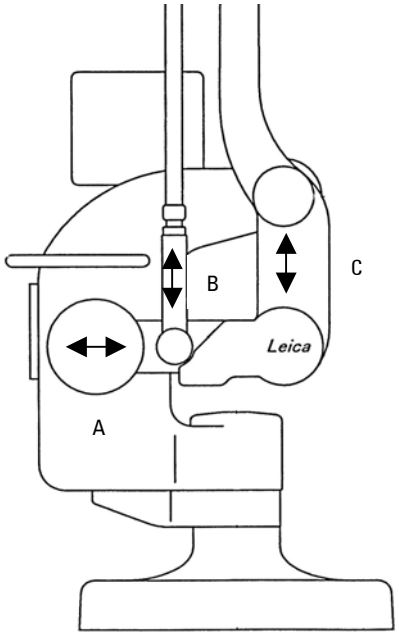
Replacing spare Xenon power supply



1. Disconnect main power

2. Remove cover on rear side of column
3. Disconnect main-, lamp output- and sense cable; refer to point 6, page 11-5
4. Loosen power supply (4x Phillips screw M3x5 with tooth lock washer)
5. Assemby: procced in reversed order

D-balance unit

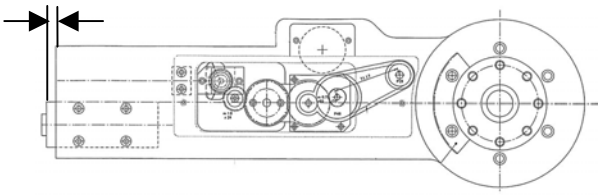


Replacing D-balance unit

Actually no replacement possible. Complete stand must be replaced.

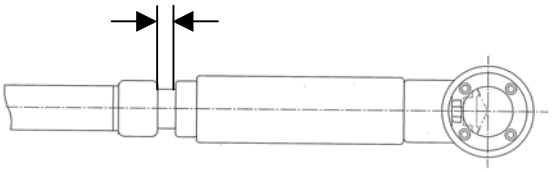
Important: The 3 measures are in relation. They must correlate and they may differ from one system to another! Register a reference measurement before doing any manipulation on this part.

Set A (weight) distance to 20.5mm and check the other measures:
B (link arm): app. 22.5mm
C (swingarm large): app. 91mm

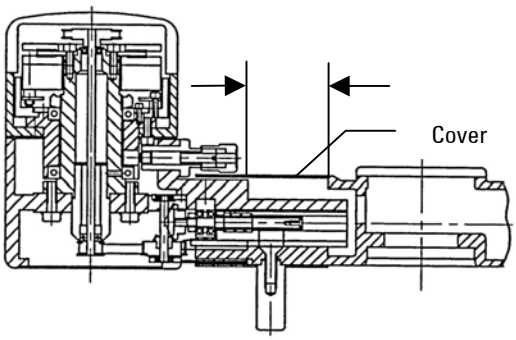


How to measure the distances:

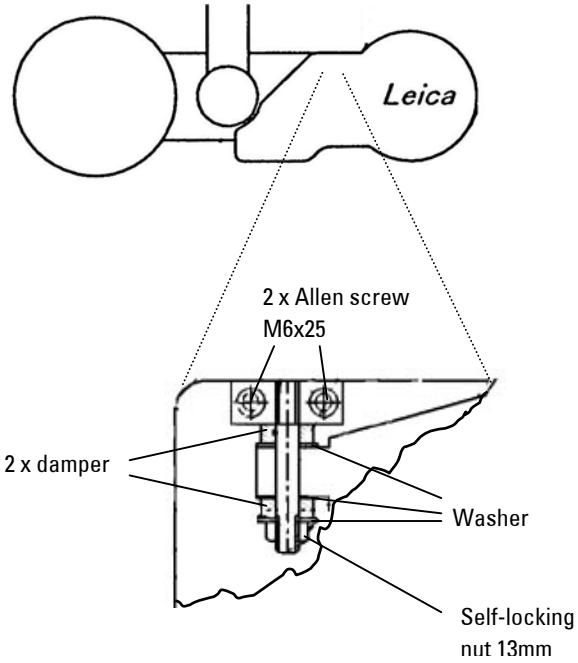
Lock stand and remove weight discs and rear weight.
Measure A:
Measure at described point, adjust to reference value by manual D-balance switch.



Measure B:
Maeasure at the described point of the link arm.



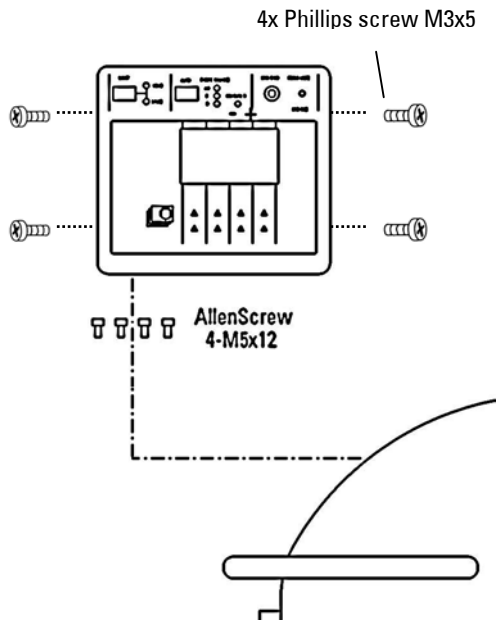
Measure C:
Remove cover (4x Phillips screws M3x5) and measure at the described point.



Replacing damper

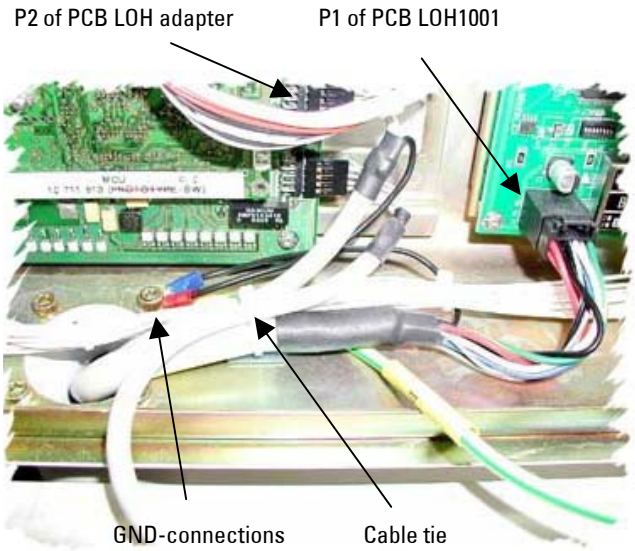
1. Remove cover „Leica“ (2 x Allen screw M5x60) – attention - heavy part!
2. Balance D-axis
3. Slacken nut with spanner 13mm
4. Loosen damper assembly (2 x Allen screw)
5. Take off damper assembly
6. Loosen nut and replace damper
7. Fix damper assembly , secure screws with Loctite 221
8. ADJUSTMENT of damper: Tighten nut moderate until free play of axis is gone; tighten further for ½ to 1 full turn; check fibration, refer to inspection section 13

Stand control unit



Replacing stand control unit

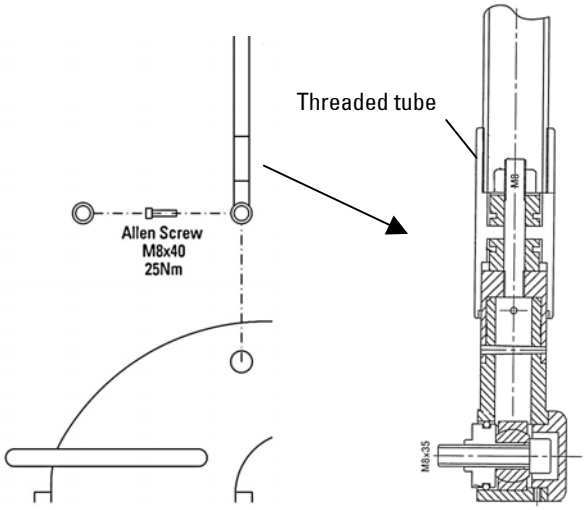
1. Remove 4 Phillips screws and tilt out front panel



2. Unplug connector P1 of PCB LOH1001
3. Unplug connector P2 of PCB LOH adapter
4. Loosen GND-wires (remove 1 Allen screw) and remove cable tie
5. Remove all Allen screws and replace control unit
6. Assembly: proceed in reversed order

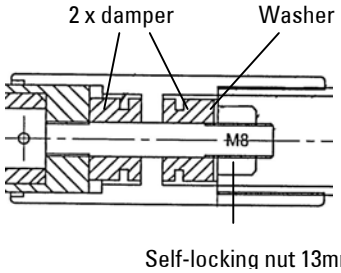
Assembly hint: ensure proper settings in device list of M500 N control unit after replacement; refer to chapter 9 – service programs

Swing arm large

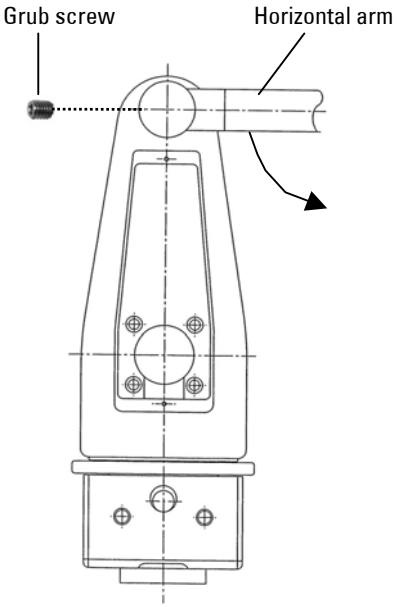


Replacing damper

7. Remove lower cover of vertical arm
8. Loosen allen screw and pull out lower part of vertical arm
9. Separate lower part: turn threaded tube cw



10. Loosen nut with 13mm nut driver
11. Separate tube and replace dampers
12. ADJUSTMENT of damper: Tighten nut moderate until free play of axis is gone; tighten further for ½ to 1 full turn; check fibration, refer to inspection section 13
13. Reassemble tube; secure it with Loctite 221
14. Assemble vertical arm (25Nm) and mount cap



Replacing brake 4 unit and axis

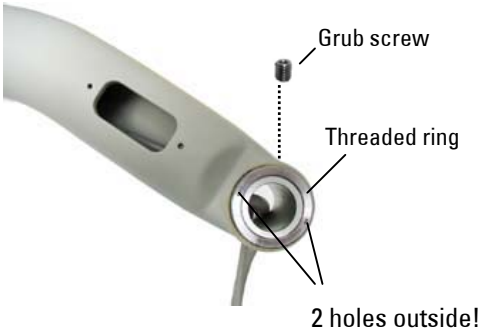
1. Lock stand
2. Remove swing carrier (refer to assembly manual)
3. Remove covers on swing arm and brake 4 casting to get access to cables
4. Remove horizontal arm from brake 4 unit: remove cap (grub screw) and loosen Allen screw M8x40; release horizontal arm, let it hang down

Assembly hint: tighten Allen screw of horizontal arm with 25 Nm

5. Remove housing from CAN cable

6. Pull out both cables
7. Remove brake 4 casting by 4 (8) screws M6x18

Assembly hint:
Secure screws with Loctite 243
Pay attention to position of cable opening
danger of cable squeezing!



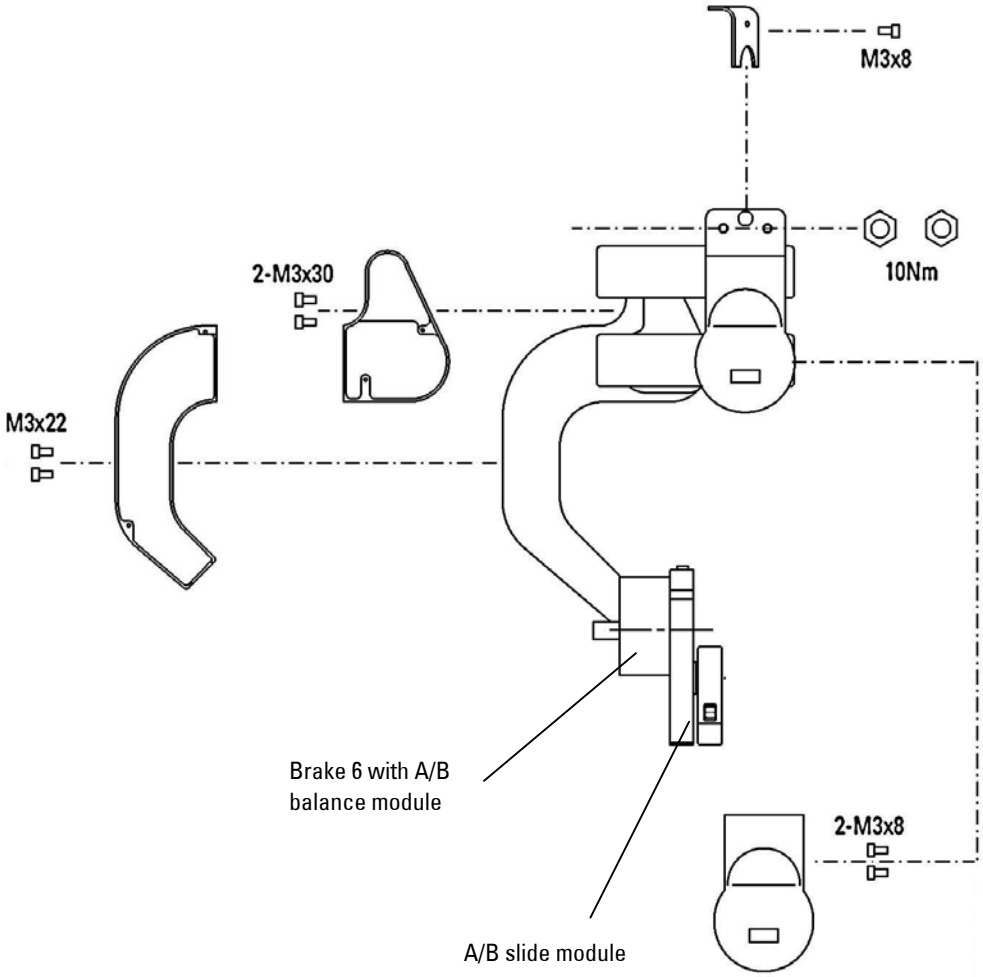
8. Remove cap to access the threaded ring: release 2mm Allen screw (M4x3)
9. Remove the threaded ring from the axis by releasing the grub screw (M4x4); unscrew ring

Assembly hint: do not tighten ring, just eliminate backlash; secure it with grub screw!

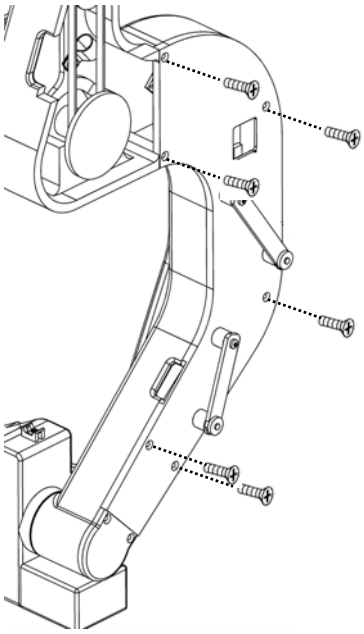
10. Remove cables out of axis by tearing from swing arm opening.
11. Remove axis
12. Assembly: proceed in reversed order;

Swing carrier

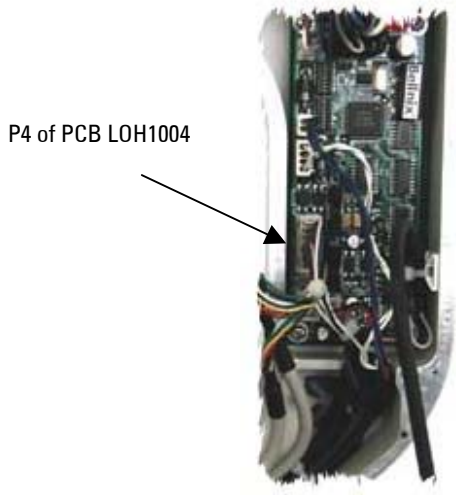
Overview



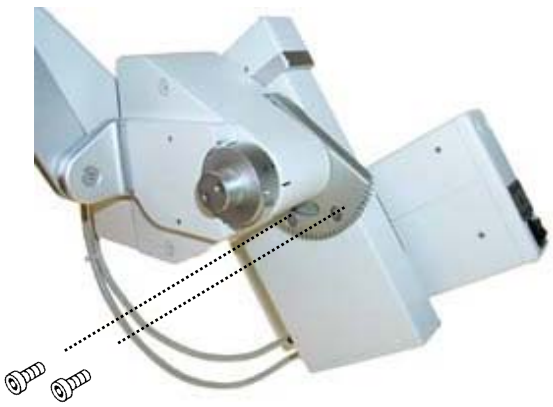
Replacing A/B slide module



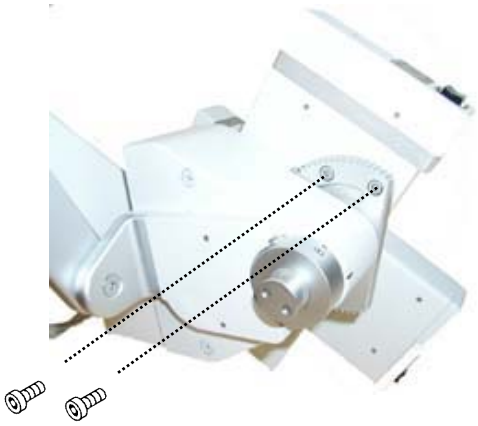
1. Lock stand
2. Remove optics carrier and handgrips – refer to assembly manual
3. Remove cover (loosen 6x Phillips screw M3x12)



4. Disconnect A/B- cable (P4)



5. Turn A/B slide to access 4 Allen screws M4x12

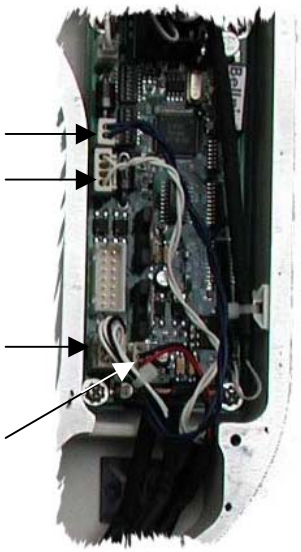


6. Release screws and take off A/B module

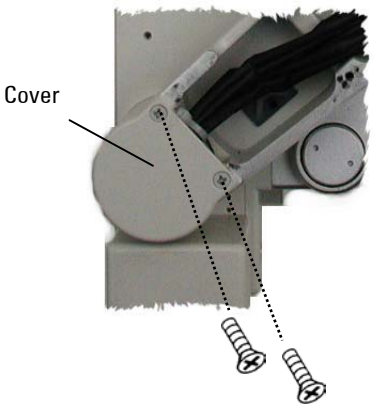
Assembly hint: secure screws with Loctite 221

7. Assembly: proceed in reversed order

Replacing brake 6 with A/B balance module



8. Proceed 1-6 from description “replacing A/B slide module”, starting on page 11-13
9. Disconnect 4 plugs (P2, P3, P5, P6) and release cables



10. Release cover: 2 Phillips screw M3x12

11. Loosen Allen screw M5x12

12. Slacken Phillips screw, remove threaded ring (turn ccw) and take off module

Assembly hint: do not tighten ring, just eliminate backlash; secure it with Phillips screw!

13. Assemly: proceed in reversed order

Maintenance service - Leica M500 OH3

General guidelines maintenance

Instruments and their accessories are generally exposed to dust and dirt.

Each time, before you use them, carry out an external inspection of accessible mechanical and optical parts such as eyepieces, optics carrier, objectives, binocular tubes and accessories; clean them if necessary.

Dust and dirt have a negative effect on the results of your work.

When the instruments are not in use, use the dust covers and dust plugs provided.

Specific guideline for the Leica M500 OH3

We recommend to do a preventive maintenance of the product annually according to the attached SOM product maintenance work list.

The attached product maintenance list contains all relevant activities. Use it as a check list during the maintenance work. The mentioned standard time should give you a coarse overview about the needed labour time.
Furthermore we recommend to terminate the maintenance by doing the inspection procedure. It does ensure the functionality of the system – refer to section 13.

In addition to above annual maintenance we recommend to check and (if needed) to re-grease concerning mechanical parts every three years.

Concerning parts are:

- Gears and spindles - use Leica grease D2m (number for 25g – 10289964)
- Slides, sliding parts - use Leica grease D2 (number for 25g – 10289966)
- Screws- use Leica grease FM5 (number for 25g – 10289967)

SOM Product Maintenance work list

Leica M500 OH3

Pos.	Surgical Operating Microscopy System / Job	OH3	Standard time in minutes
0	**General/ Safety**		
0.1	Mains connection: damage/ proper fitting/ cables approved (local regulation)/ physical hazard (danger of stumble)	1	5
0.2	Leaking current within specification according EN60601-1 (specification at the time of installation)	1	15
0.3	Earth contact: damage, fitting, earth bonding resistance	1	15
0.4	Check and report the system configuration in the protocol (see section 13/inspection)	1	10
0.5	Safety labels existing/ System labels existing/ CE labels; all labels readable;	1	2
0.6	Do the sterile covers/knobs fit/hold properly	1	2
0.7	Upgrades/ updates concerning the according Service News (Source of the Service News: Intranet, B2B)	1	5
0.8	Check the system for contamination: Fungus, Oxidation, ...	1	10
0.9	Check the function of the emergency light source referring Pos. 6	1	0
0.10	Check the zoom emergency drive	1	2
0.11	Is the customer instructed how to use the emergency zoom drive (see to user manual)	1	2
0.12	Functioning test of the focus emergency drive	1	2
0.13	Check for security related interfaces	1	5
1	**Base**		
1.1	Casters check	1	5
1.2	Brakes check	1	5
1.3	Damper/ Vibration damper	1	5
2	**Column**		
2.1	Brakes	1	2
2.2	Cables: twisted, worn out, insulating material, cable fixation	1	5
2.3	check security related interfaces	1	2
3	**Swingarm**		
3.2	Up/down movement is smooth trough the whole range	1	2
3.3	Cables: twisted, worn out, isolating material, cable fixation	1	5
3.4	Retention force of the brakes	1	2
3.5	Adjustment of the brakes (Gap between anchor and magnet). Is there any noise while moving with released brakes?	1	5

Pos.	Surgical Operating Microscopy System / Job	OH3	Standard time in minutes
3.6	Continuity and range of rotary motion	1	2
4	**Microscope control and Stand**		
4.1	Read-out of the error messages-> Report in the protocol	1	5
4.2	Erase/delete the errors	1	1
4.3	Software Version: look up the version and report in the protocol (optics carrier and control unit M500 N, LOH adapter, PLC; see section 13/inspection)	1	5
4.4	SW upgrade regarding to the suggestion from the Service News	1	0
4.5	Sensor/ balance modules test: range up/down, symmetry, offset	1	10
4.6	Tendency of drifting if the brakes are released -> solve/report	1	2
4.7	Cables: twisted, worn out, insulating material, cable fixation	1	5
4.8	Counter weight: configuration, interface ok, lock screw present, all discs present	1	5
4.9	D-Balancing unit: continuity of the movement, motor and end-switches, range	1	5
4.10	Lock position reachable?	1	2
4.11	Balancing with minimum and maximum loading according the user manual	1	20
4.12	Fans working	1	2
4.13	Handles: Function test, SW Version according the handles requirement's), Setting in the device list (refer to section 9/service programs)	1	10
4.14	Do all knobs fit properly/ not loose	1	2
4.15	Check security related interfaces (tension rod)	1	5
4.16	check damping modules	1	2
5	**Main-illumination**		
5.1	Functioning test	1	2
5.2	Warm ignition (15min on, 5min off and re-ignite)	1	2
5.3	Look up the operation hours and report on the protocol	1	2
5.4	Filter applied?	1	2
5.5	Contamination of the whole illumination path	1	5
5.6	Condition of the fibre optics cable. Approx. <10% single fibres are broken (black spots)? Use torch or daylight, NOT the Xenon Illumination unit!	1	5
5.7	Fans	1	2

SOM Product Maintenance work list

Leica M500 OH3

Pos.	Surgical Operating Microscopy System / Job	OH3	Standard time in minutes
6.1	Functioning test	1	2
6.2	Does the fibre optic cable fit into the emergency illumination outlet?	1	2
6.3	Warm ignition (15min on, 5min off and re-ignite)		
6.4	Look up the operation hours and report on the protocol		
6.5	Filter applied?	1	2
6.6	Contamination of the emergency light path	1	5
6.7	Fans	1	5
7	**Illumination in general**		
7.1	Fault identification if one bulb has gone?	1	2
8	**Microscope carrier/ swing carrier**		
8.1	Balancing of the A-slide	1	2
8.2	Balancing of the B-slide	1	2
8.3	Balancing of the C-slide	1	2
8.4	Check for security related interfaces	1	5
8.5	Cables: twisted, worn out, insulating material, cable fixation	1	5
8.6	Range of rotation, no tension on the cables	1	2
8.7	Continuity of the rotation/ range of the rotation	1	2
9	**Foot-, hand- and remote release-switches**		
9.1	Functioning test	1	5
9.2	Cables and bush/socket: twisted, worn out, insulating material, cable fixation	1	5
9.3	Contamination	1	5
10	**Optics carrier**		
10.1	Alignment/ adjustment	1	30
10.2	Contamination of the path of observation	1	15
10.3	Dove tail interface: fitting, contamination, loose screws	1	5
10.4	Continuity of the zoom's movement (min. and max. speed)	1	2

SOM Product Maintenance work list

Leica M500 OH3

Pos.	Surgical Operating Microscopy System / Job	OH3	Standard time in minutes
10.5	Does the zoom move throughout the whole range.	1	2
10.6	Does the focus move throughout the whole range	1	2
11	**Focus- and XY movement**		
11.1	Does the focus move throughout the whole range	1	5
11.2	Smoothness of the tilt and focus movement when motor driven with minimum- and maximum speed	1	5
11.3	Smoothness of the xy movement with minimum- and maximum speed	1	5
12	**Binocular tube**		
12.1	Check the bellows concerning damages	1	2
12.2	Wearing-, consumable-parts: eyecups (backlash, smoothness, defective or loose rubber)	1	5
12.3	Check the functioning of the diopter alignment	1	5
12.4	Check the smoothness of the tilt movement	1	2
12.5	Check the stability of the tilt movement and tightness of the brake	1	2
12.6	Optical inspection of the alignment, adjustment	1	30
12.7	Check the alignment/ movement of the pupil distance adjuster (PD adjuster)	1	2
	Approximately needed standard time		**388**

General inspection after one year of operation.

Carry out the maintenance steps above, according to the instructions in the Service Manual, User Manual and the data published on the internet/ intranet (Service Forum, Service News)

Definition:
1: means the maintenance work is valid

13. Inspection - Leica M500 OH3

Table of content

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Leakage current test 13-3
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Test Certificate for Leica M500 OH3

Configuration:

System	Serial no.	Software version	Remark
Stand OH3	Base: Column: D-balance unit: Swing carrier:	PLC: LOH-adapter: Handle left: Handle right:	
Microscope system o M500 N or o M520 N	Optics carrier: Control unit:	Optics carrier: Control unit:	
Illumination	Main bulb: Operation hours: Spare bulb: Operation hours:		
Settings	**Value**		**Remark**
Main voltage set to: Installed weight discs:	o 100V o 120V o 220V o 240V Light discs: Heavy discs:		

List of accessory and its weight

Attached	Accessory	Stock nbr.	Single weight	Total weight
	Eyepiece f. spect. W's 10x/21B	10446485	0.1 kg	
	Binocular tube variable 30-150°	10446797	0.8 kg	
	Binocular tube variable 0-180°incl. Eye pieces	10446573	1.4 kg	
	Inclined binocular tube, T	10446574	0.75 kg	
	Straight binocular tube, T	10446587	0.7 kg	
	Inclined binocular tube 45°	10446618	0.6 kg	
	Stereo attachment for 2nd observer	10446475	1.0 kg	
	Beam splitter 50/50	10446482	0.4 kg	
	Beam splitter 70/30	10446565	0.4 kg	
	Zoom video adapter	10446592	0.75 kg	
	Photo/TV attachment for beam splitter	10445319	1.0 kg	
	Cine/TV tube	10446816	0.6 kg	
	TV objective f=107mm	10445326	0.1 kg	
	Photo objective f=350mm	10445323	0.2 kg	
	Phototube for beam splitter	10446851	0.8 kg	
	Tube adapter, 30° rotatable	10445349	0.2 kg	
	Counter weight M500 N (without beam splitter)	10446570	3.0 kg	
	Counter weight M 500 N including beam splitter	10446527	3.4 kg	
	ULT500 Ultra Observer	10446854	3.4 kg	
	DI C500 Dual Imaging Color Module	10446853	4.2 kg	
	Mouthswitch	10446544	0.3 kg	
	Video camera Sony DXC 107AP	10446702	0.4 kg	
	Digital video camera Sony DFW-X700		0.25 kg	
*Total weight				

* Maximum weight permitted onto dovetail interface of microscope: 11.5 kg

Leakage Current Test related to IEC 601-1

Description	Permitted value	Actual value
Stand + main Xenon lamp	< 90 µA	µA
Stand + spare Xenon lamp	< 90 µA	µA

Entries

Step	Description	Required results	O.K.	Fails
1	**General**			
	WARNING! Never do look directly in to the light source!			
1.1	Lock stand with two locking knobs.	Optics carrier movement is locked for up/down- and forward/backward direction.		
1.2	Loosen star grip and turn footbrake to “free” position.	The stand can be moved easily.		
1.3	Turn footbrake to “locked” position and tighten star grip.	The stand stays stable, the footbrake lever is locked.		
1.4	Switch the stand on.	Main switch shines green. Zoom and focus initialise. M500 N control unit starts up user interface. No error messages on the M500 N control unit. Auto balance key dark; lamp key dark.		
2	**Illumination**			
2.1	Release fibre optics cable from lamp outlet.	Main and spare LED dark, lamp key yellow blinking.		
2.2	Insert fibre optics cable to main lamp outlet.	Main LED shines green.		
2.3	Press lamp key.	Lamp key is green. Xenon bulb ignites without delay.		
2.4	Observe field of illumination; set diaphragm of optics carrier to maximum	Homogeneous illumination in the complete field.		
2.5	Turn attenuator knob of main lamp through position 1..6	Intensity increases step by step, maximum at 6		
2.6	Insert fibre optics cable to spare lamp outlet.	Spare LED shines yellow.		
2.7	Press lamp key.	Lamp key is green. Xenon bulb ignites without delay.		

Step	Description	Required results	O.K.	Fails
2.8	Observe field of illumination; set diaphragm of optics carrier to maximum	Homogeneous illumination in the complete field.		
2.9	Turn attenuator knob of main lamp through position 1..6	Intensity increases step by step, maximum at 6		
2.10	Open bulb door	Illumination goes off; lamp key blinking yellow.		
2.11	Remove main bulb; close bulb door; insert fibre optics cable to main lamp outlet.	Lamp key blinking yellow.		
2.12	Remove spare bulb; close bulb door; insert fibre optics cable to spare lamp outlet.	Lamp key blinking yellow.		
3	**Auto balance and brakes**			
3.1	Unlock stand; turn optics carrier to position A and press auto balance key.	Auto balance key yellow blinking, buzzer sounds with 1 Hz, A-axis starts balancing; buzzer stops.		
	Turn optics carrier to position B and press auto balance key.	Auto balance key yellow blinking, buzzer sounds with 1 Hz, B-axis starts balancing; B-axis finish balancing, C-axis and D-axis start balancing; C-axis finish, D-axis finish. Auto balance key dark, no buzzer sounds. All balance LED's are dark.		
3.2	Set selector switch for brakes to position "Focus-lock" and press side button of left handgrip.	Brakes are released for the tilt, tip and rotation movements of the microscope. It can be moved smoothly without grating. Microscope is balanced in A-, B- and C-axis.		
3.3	Press side button of right handgrip.	Brakes are released for the tilt, tip and rotation movements of the microscope.		
3.4	Set selector switch for brakes to position "XYZ_free" and press side button of handgrip.	Brakes are released for the X, Y and rotation axis of the stand. Microscope can be moved smoothly without grating. Microscope is balanced in X and Y-axis.		
3.5	Press rear button of left handgrip.	All 6 brakes are released; microscope can be moved in all axes.		
3.6	Press rear button of right handgrip	All 6 brakes are released; microscope can be moved in all axes.		

Step	Description	Required results	O.K.	Fails
4	**Manual balance**			
4.1	Turn microscope to position A; press manual balance switch A: upper contact	A-slide moves backward.		
	Press manual balance switch A: lower contact	A-slide moves forward.		
	Move to front or rear limit.	AB LED shines yellow.		
4.2	Turn microscope to position B; press manual balance switch B: upper contact	B-slide moves backward.		
	Press manual balance switch B: lower contact	B-slide moves forward.		
	Move to upper or lower limit.	AB LED shines yellow.		
4.3	Press manual balance switch C: left contact	Swing carrier moves to left side.		
	Press manual balance switch C: right contact	Swing carrier moves to right side.		
	Move to left or right limit.	C LED shines yellow.		
4.4	Press manual balance switch D: left contact	D-weight moves in direction to microscope.		
	Press manual balance switch D: right contact	D-weight moves away from microscope.		
	Move to front or rear limit.	D LED shines yellow.		
5	**Damper**			
5.1	Lock base with footbrake and balance stand; establish 90° position of swing arm; switch on illumination.			
	Push microscope 3cm sideward (which affects damper of base) and release it.	No feeling of free movement detectable. Watch light on floor and measure time until movement disappears; time must be 4 seconds or less.		
	Push microscope 3cm downward (which affects damper of D-balance unit) and release it.	No feeling of free movement detectable. Watch light on floor and measure time until movement disappears; time must be 4 seconds or less.		
	Push microscope 3cm in direction to base (which affects damper of vertical arm) and release it.	No feeling of free movement detectable. Watch light on floor and measure time until movement disappears; time must be 4 seconds or less.		

Step	Description	Required results	O.K.	Fails
6	**Range of movement**			
6.1	Release rear button of handgrip; turn stand.	Stand can be rotated (axis 1) without limit.		
6.2	Release rear button of handgrip; move the microscope to the stops in X- and Y-direction.	Fibre optics cable and other cables are free of tension. No collisions of mechanical components do occur.		
6.3	Release rear button of handgrip; turn the microscope around axis 4.	The swing carrier allows 540° rotation around axis 4. Fibre optics cable and other cables are free of tension. No collision of mechanical components does occur.		
6.4	Release rear button of handgrip; tilt microscope left/right (around tip axis)	The microscope can be moved in the range of +/- 50°. Fibre optics cable and other cables are free of tension. No collision of mechanical components does occur.		
6.5	Release rear button of handgrip; tilt microscope front/rear (around A/B axis)	The microscope can be turned in the range of – 30/+120°. Fibre optics cable and other cables are free of tension. No collision of mechanical components does occur.		
7	**X/Y movement**			
7.1	Set user function for CAN handle left and right to Y/Y for this test; turn speed knob cw to maximum			
	Activate joystick of left handgrip to all directions: X+, X-, Y+, Y-	Microscope moves smoothly to appropriate direction; X direction needs app. 90 seconds from limit to limit; Y direction needs app. 150 seconds from limit to limit.		
	Activate joystick of right handgrip to all directions: X+, X-, Y+, Y-	Microscope moves smoothly to appropriate direction;		
	Turn speed knob ccw to minimum; activate joystick of handgrip to all directions: X+, X-, Y+, Y-	Microscope moves smoothly to appropriate direction;		
8	**Fans**			
8.1	Inspect all fans.	Fans clean; easy to be turned.		

Step	Description	Required results	O.K.	Fails
8.2	Switch the stand on.	2 fans in housing of column (fan 1) run. 1 fan in DC power module (fan 2) runs. Fan for main Xenon bulb (fan 4) runs. 2 fans of main Xenon power supply (fan 3) run.		
	Select spare bulb, start ignition.	Fan for main Xenon bulb stops, fan for spare xenon bulb starts. 2 fans of main Xenon power supply stop, 2 fans of spare Xenon power supply start.		
9	**Cable**			
9.1	Inspect for damages: fibre optics, all cables and their connectors	Seem undamaged.		
10	**Options**			
10.1	Footswitch			
	Press each footswitch key	The M500 N control unit recognizes all keys.		
10.2	Mouthswitch			
	Press mouthswitch	3 brakes release.		
11	**M500 N optics carrier**			
11.1	Press focus up button at left and right handle.	Working distance increases.		
11.2	Press focus down button at left and right handle.	Working distance decreases.		
11.3	Observe movement of focus	Uniform focus movement at both min and max speed (30sec....8sec).		
11.4	Press zoom up button at left and right handle.	Magnification increases.		
11.5	Press zoom down button at left and right handle.	Magnification decreases.		

Step	Description	Required results	O.K.	Fails
11.6	Observe movement of zoom.	Uniform zoom movement at both min and max speed (12sec...5sec).		
11.7	Unplug and plug in fibre optics.	Fibre optics does snap in noticeable.		
11.8	Press switch for laser application.	Yellow LED beside of the switch shines. Handle switches and arrow keys of control unit cannot alter working distance anymore.		
11.9	Turn emergency drive of focus.	Display of working distance on M500 N control unit indicates changes from turning knob.		
11.10	Turn emergency drive of zoom.	Display of magnification on M500 N control unit indicates changes from turning knob.		
12	**M500 N control unit**			
12.1	Display the list of errors in the service menu (6642). Note and erase error messages.	No error messages are stored.		
12.2	Use cursor keys to change focus speed, zoom speed, zoom magnification and WD.	Values can be changed as required.		
13	**Accessories**			
	Refer to appropriate service manuals			

14. Spare parts - Leica M500 OH3

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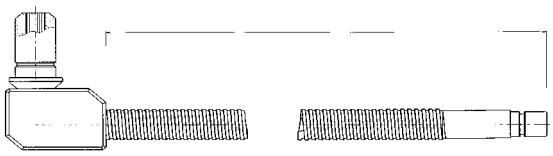
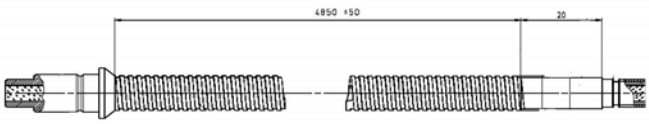
Stock n°	Description / Specification	Remark	Drawing

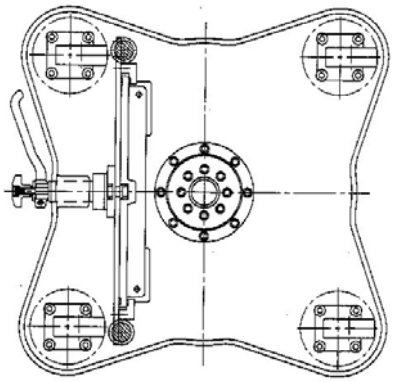
Spare parts - Leica M500 OH3

General parts

10711932	Set of screws	contains: 4 nuts 17mm M10 1 nut 22mm M14, several other screws	
10711933	Toolset	Delivered with each unit. Contains: 1 T-spanner 17mm, 1 spanner 22mm, allen key set, 1 set cable ties, 2 fuses 5AT, 2 fuses 10AT, screw-set 2 screwdriver vessel 9900 (75/100)	
10711927	Velcro straps	(fixing cable duct cover)	
10182490	Power cable CH		
10445664	Power cable USA		
10445665	Power cable EU		
10445666	Power cable BS		
10446488SP	Fibre optics, lenght=4.45m this part will be replaced with below one!		
10448027SP	Fibre optics, length= 4.85m		

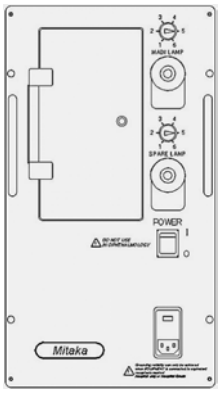
Stock n°	Description / Specification	Remark	Drawing

Base

10711923R	**Base complete**	**PART NOT AVAILABLE**	
10711945	Castor		
10711946	Blue damper	for brake 1, 2, 3	
10711947	Brake 1	PART NOT AVAILABLE	
10711948	Rubber pad		

Stock n°	Description / Specification	Remark	Drawing

Column

10711979R	Control unit with light house	(bulbs not included)	
10711980	Microswitch for bulb door and fiber detection		
10711981	Microswitch for bulb detection		
10711982	Transformer OH3		
10711934	DC power module		
10711983	Power inlet		

Stock n°	Description / Specification	Remark	Drawing
10711896	Line filter		
10711023	Main switch		
10711984	Knob cover and knob and collar		
10448022	Xenon lamp		
10711880	Xenon power module		
10711935	PCB LOH-1002		
10711924	Lock for brake 2		

Stock n°	Description / Specification	Remark	Drawing
10711925	Lock for brake 3		
10711936	Stop for vertical arm	including screw: M8 x 70 DIN912 A2-70	
10711985	Column handle		
10711986	Fan 1	MD825B-24L (for housing column)	
10711987	Fan 2	109P0624H702 (for DC power module)	
10711988	Fan 3	109P0624H702 (for Xenon power supply)	

Stock n°	Description / Specification	Remark	Drawing
10711989	Fan 4	MD925A-24L: with built-in sensor (for Xenon bulb)	
10711990	Brake 2	PART NOT AVAILABLE RNB-5G (including shim set)	

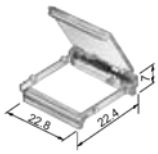
Stock n°	Description / Specification	Remark	Drawing

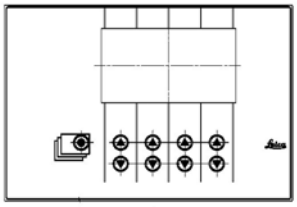
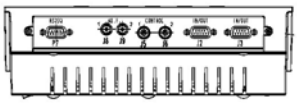
Stand control unit

10711926R	**Stand control unit**		
10711804	LOH adapter complete		
10711937	PCB LOH-1001		
10711991	PLC	including 2 cables	
10711992R	Switch board (control panel)	including cable and front cover	

Stock n°	Description / Specification	Remark	Drawing

Single parts for switch board:

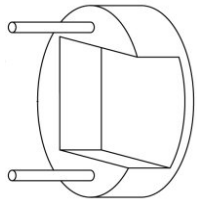
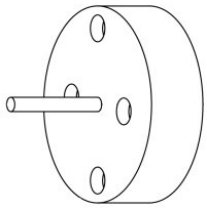
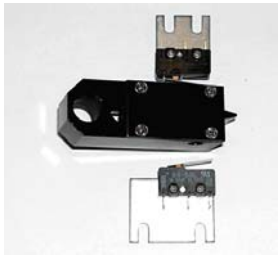
10711993	Switch xenon		
10711994	Switch autobalance	(including transparent cover)	
10711995	Transparent cover for autobalance switch		
10711996	LED green	including socket	
10711997	LED yellow	including socket	
10711998	Switch “manual D-balance”	inluding washers and nut	
10711999	Switch “brake selection”	including washers and nut	
10712000	Speed potentiometer		
10711984	Knob cover and knob and collar		

Stock n°	Description / Specification	Remark	Drawing
10 711851	M500 N Control unit OH3	Single parts: refer to M500 N - Service manual	
	This part can be covered through the existing control unit M500 N: 10446 489 Control unit MEL72 for M500 N How to make it compatible: Remove the holder 10706174; SW must be 1.81 or higher		

Stock n°	Description / Specification	Remark	Drawing

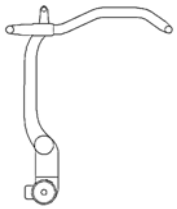
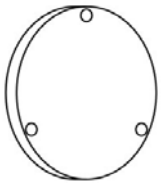
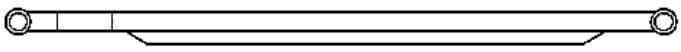
D-balance module

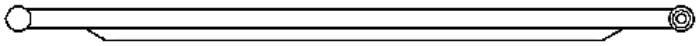
10712001R	D-balance module	PART NOT AVAILABLE	
10712153	Cover for d-balance module		
10712002	D-balance motor	SS23F (motor 11)	
10712003	Set of belts for D-balance	5 pieces	
10712004	Cover for weights	LOH506	
10711930	Removable weight (disc) 5mm		
10711931	Removable weight (disc) 15mm		

Stock n°	Description / Specification	Remark	Drawing
10712005	Fixed weight (rear)		
10712006	Fixed weight (front)		
10712007	Solenoid for D-balance	4E	
10712008	Balancing mechanism for D-balance	(including 2 switches)	

Stock n°	Description / Specification	Remark	Drawing

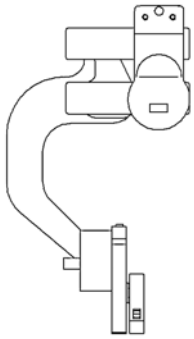
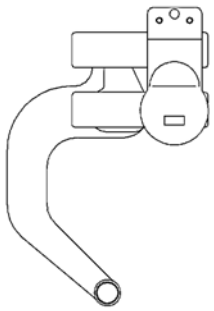
Swing arm large

10712009R	Swing arm large	PART NOT AVAILABLE	
10712010	Cover plate of swing arm		
10712011	Cap of swing arm large (rear)		
10712012	Link arm		
10712013	Seal of Link arm		
10712014	Cap of Link arm		
10711928	Vertical arm	(cable duct, including cover part)	
10712015	Blue damper for vertical arm		

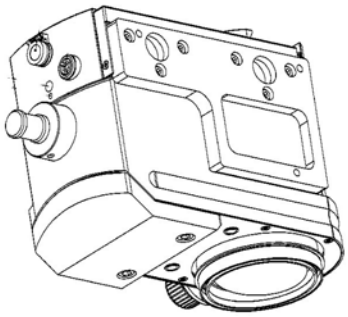
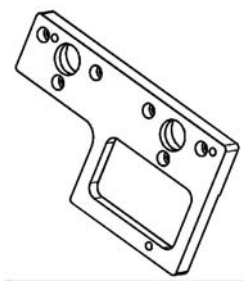
Stock n°	Description / Specification	Remark	Drawing
10711969	Cover for vertical arm	length: 625mm	
10711970	Cover for horizontal arm	length: 735mm	
10712016	Cap for vertical/horizontal arm		
10711929	Horizontal arm	(cable duct, including cover part)	
10712017R	Brake 4 unit		
10711964	Cover at brake 4		

Stock n°	Description / Specification	Remark	Drawing

Swing carrier (swing arm small)

10711938R	**Swing carrier**	**complete unit**	
10663925	Nut M10 for swing carrier		
10712018R	A/B slide module		
10712019R	Brake 6 with A/B balance module		
10712020R	C-module	(no A/B slide, no brake 6)	
10711966	Lower cover small swingarm		
10711967	Upper cover small swingarm		

Stock n°	Description / Specification	Remark	Drawing
10711965	Cover at brake 5	Including switch and cable	
10712257	Motor C	HG37-030-AB-00	
10712258	Belt for Motor C	S3M276	
10712024	Motor for Y (or X)	NO REPLACEMENT POSSIBLE Type SCL16G-3504A-24 *103D010062 *103D010150	
10712025	Belt for Motor Y (or X)	S2M84	
10712026	Motor for A or B	Type LC22G-103	
10712256	Belt for Motor A or B	S2M134	
10712027	Balancing mechanism A, B		

Stock n°	Description / Specification	Remark	Drawing
10712028	Switch for manual balance	(A or B or C)	
10712029	Switch for A/B position detection		
10712030	Limit switch for A or B slide		
10711944	PCB LOH-1004		
10711943	PCB LOH-1003		
10448019	M500 N optics carrier OH3 Can be covered through the existing optics carrier M500 N: 10446757 M500 N optics carrier How to make it compatible: Remove the A/B slide, add adapter plate 10711883 and cover 10711882		
10711883	Adapter plate		

Stock n°	Description / Specification	Remark	Drawing
10711882	Cover		

Stock n°	Description / Specification	Remark	Drawing

Handgrip

10711968 **Handgrip complete**

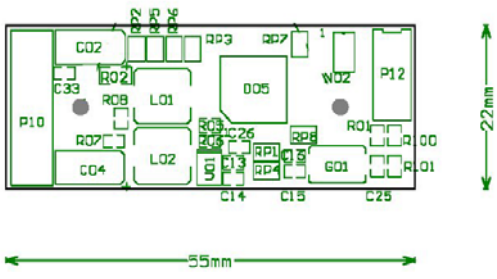
10711968R

10712021 Handgrip left — Including all switches

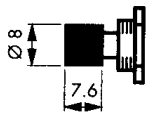
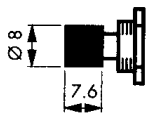
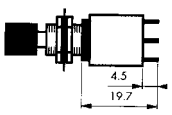
10712022 Handgrip right — Including all switches

10711939 joystick for handgrip

10712054 CAN controller right

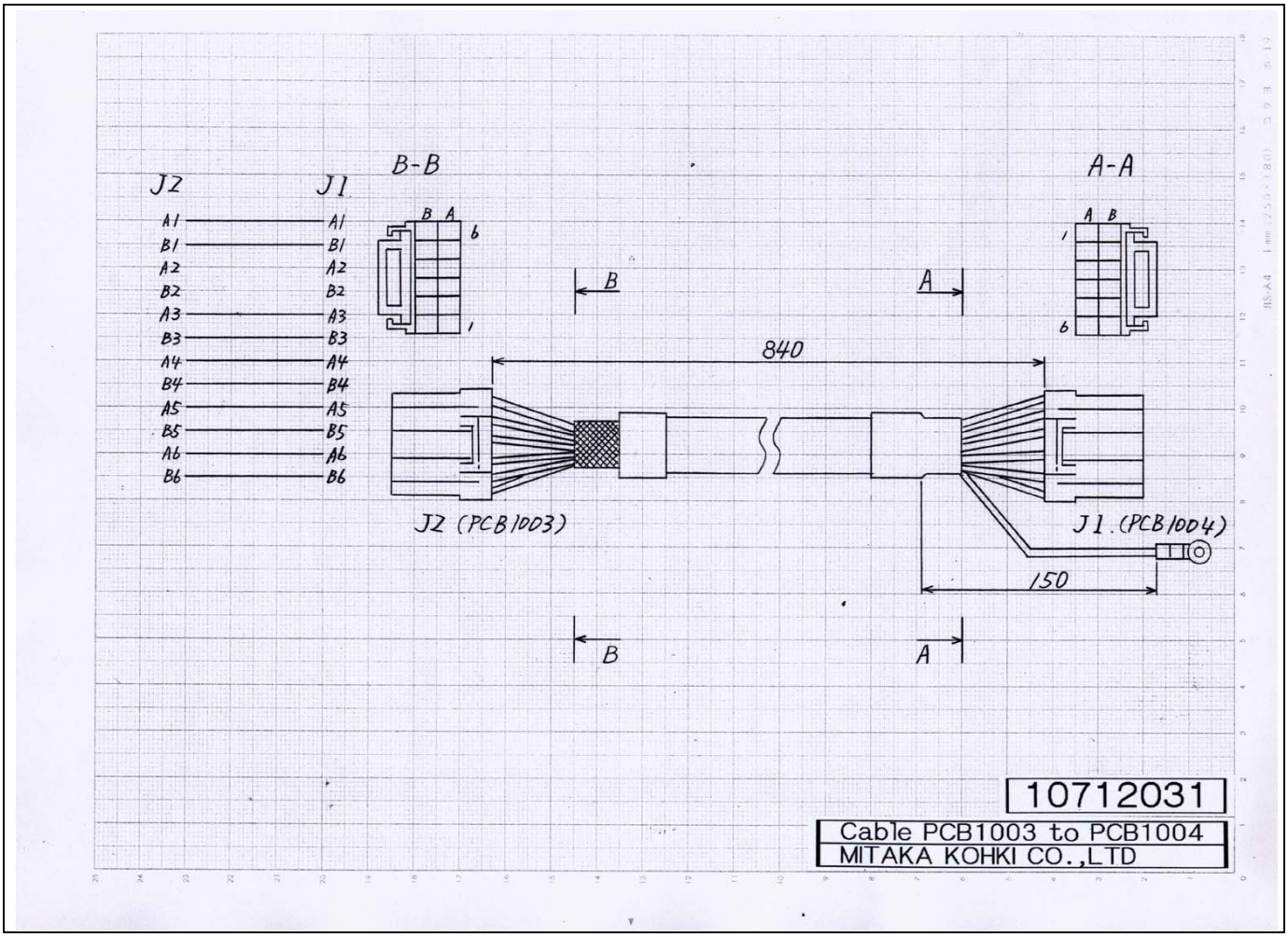


10712055 CAN controller left — Difference to right CANcontroller:
1 resistor

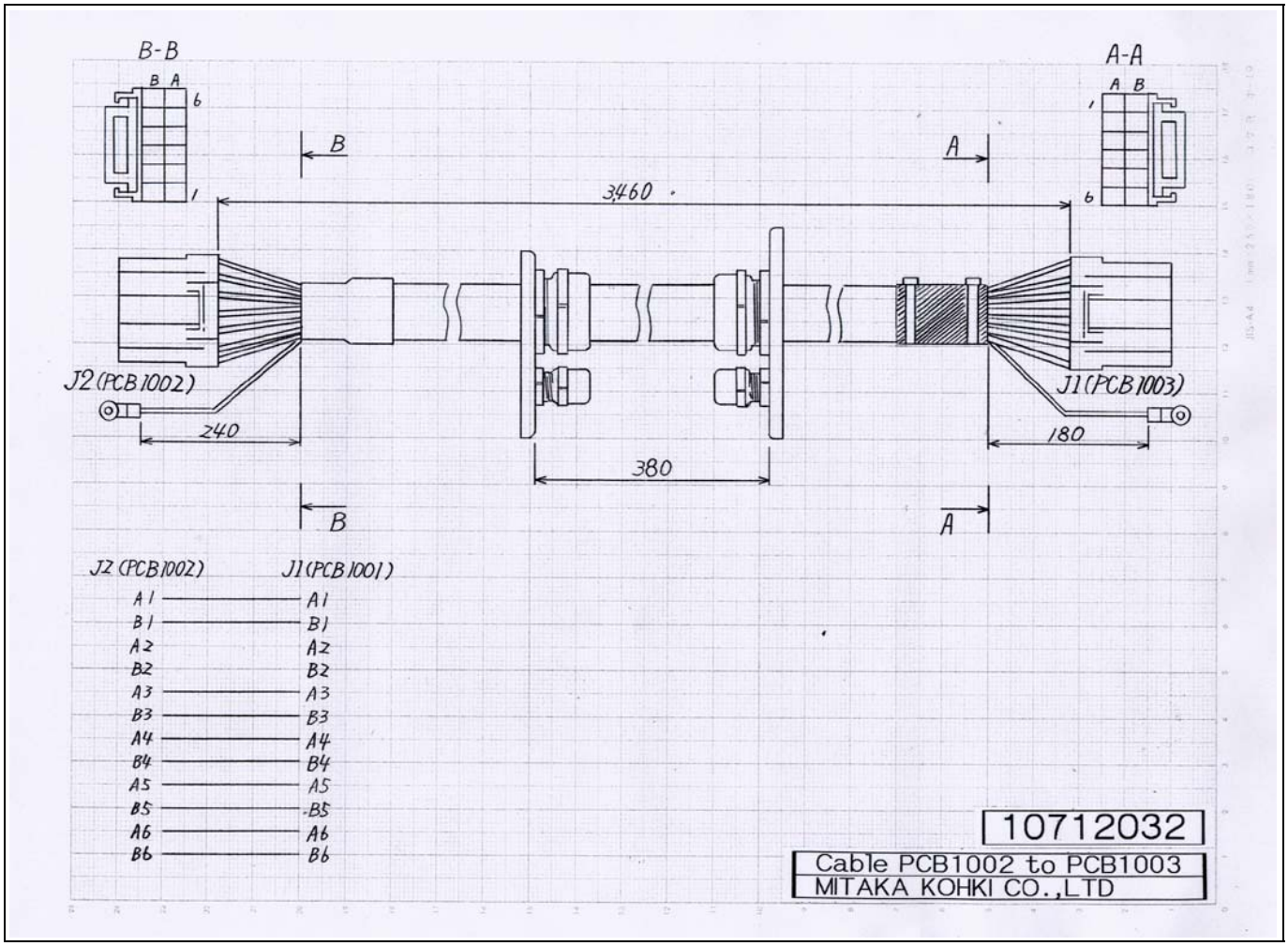
Stock n°	Description / Specification	Remark	Drawing
10712252	Handgrip Stopper plate	incl. 2 screws M2x5	
10711940	Handgrip joint left		
10711941	Handgrip joint right		
10711942	Lever 1 for handgrip	incl. washers and bearing	
10712023	Lever 2 for handgrip	incl. washers and bearing	
10708633	Button, black, ∅8mm	"All free" button	
10710089SP	Button, white, ∅8mm	“Side” button	
10710090SP	Push button switch	without button	
10710088SP	Nut	for switches	

Stock n°	Description / Specification	Remark	Drawing

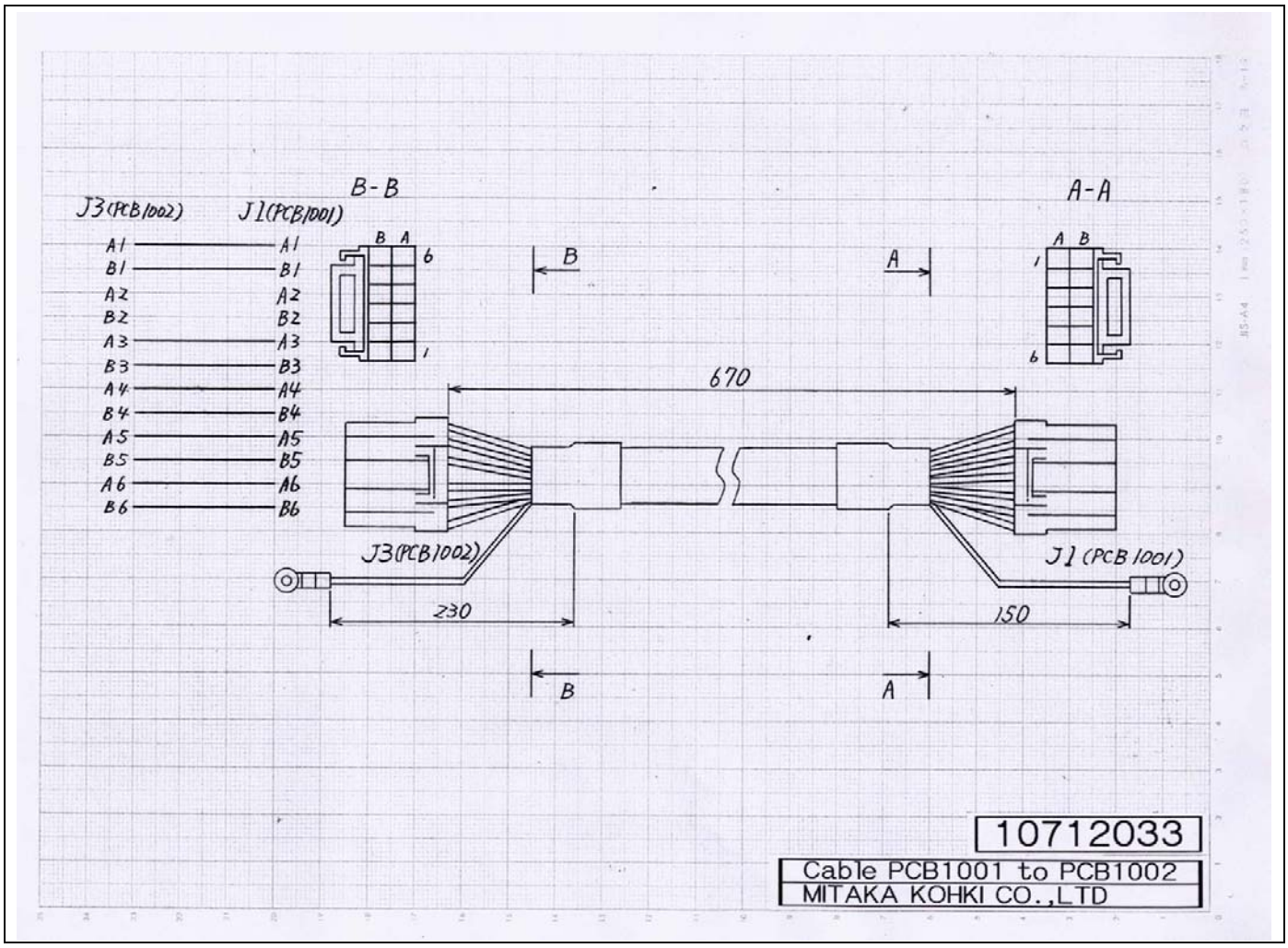
Cable



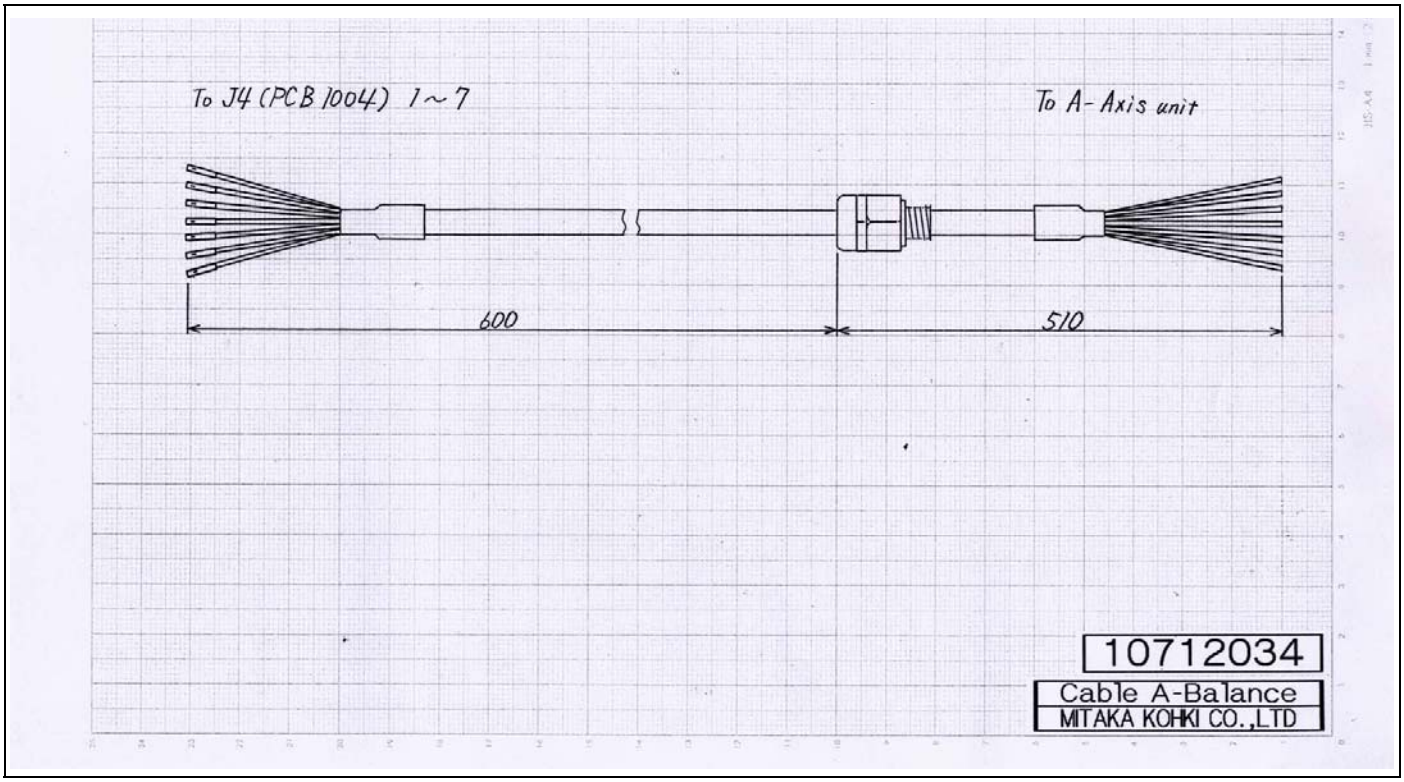
Stock n°	Description / Specification	Remark	Drawing

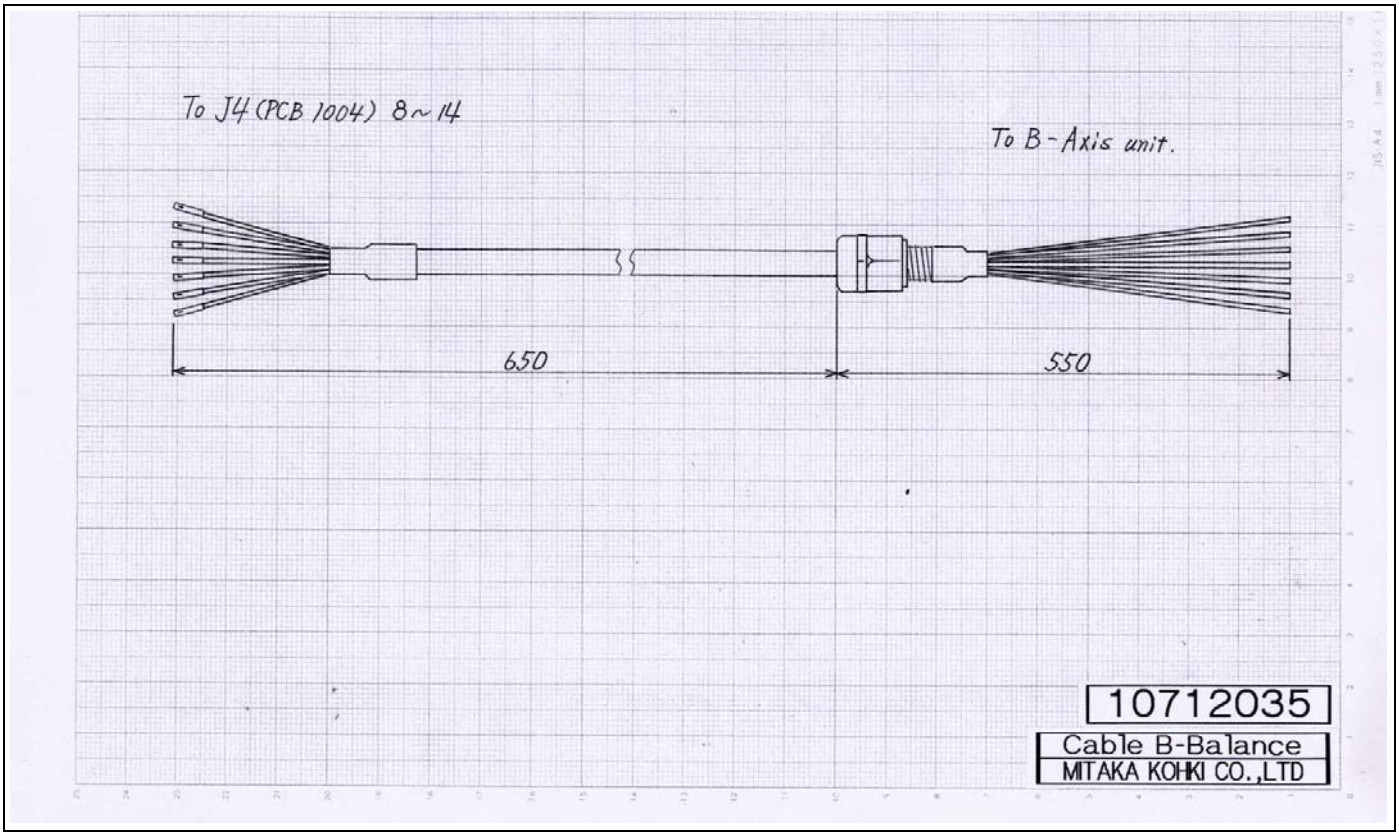


Stock n°	Description / Specification	Remark	Drawing

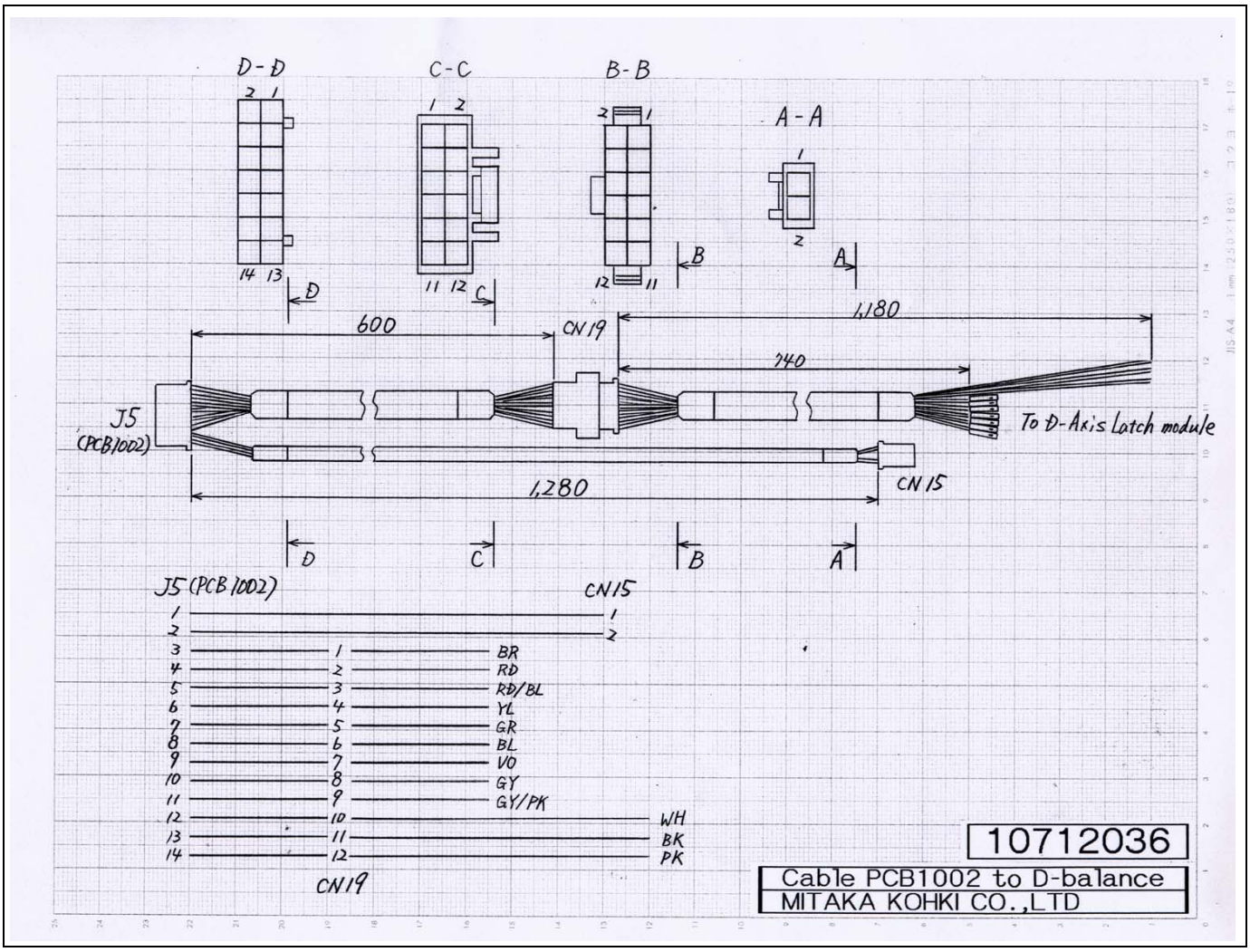


Stock n°	Description / Specification	Remark	Drawing

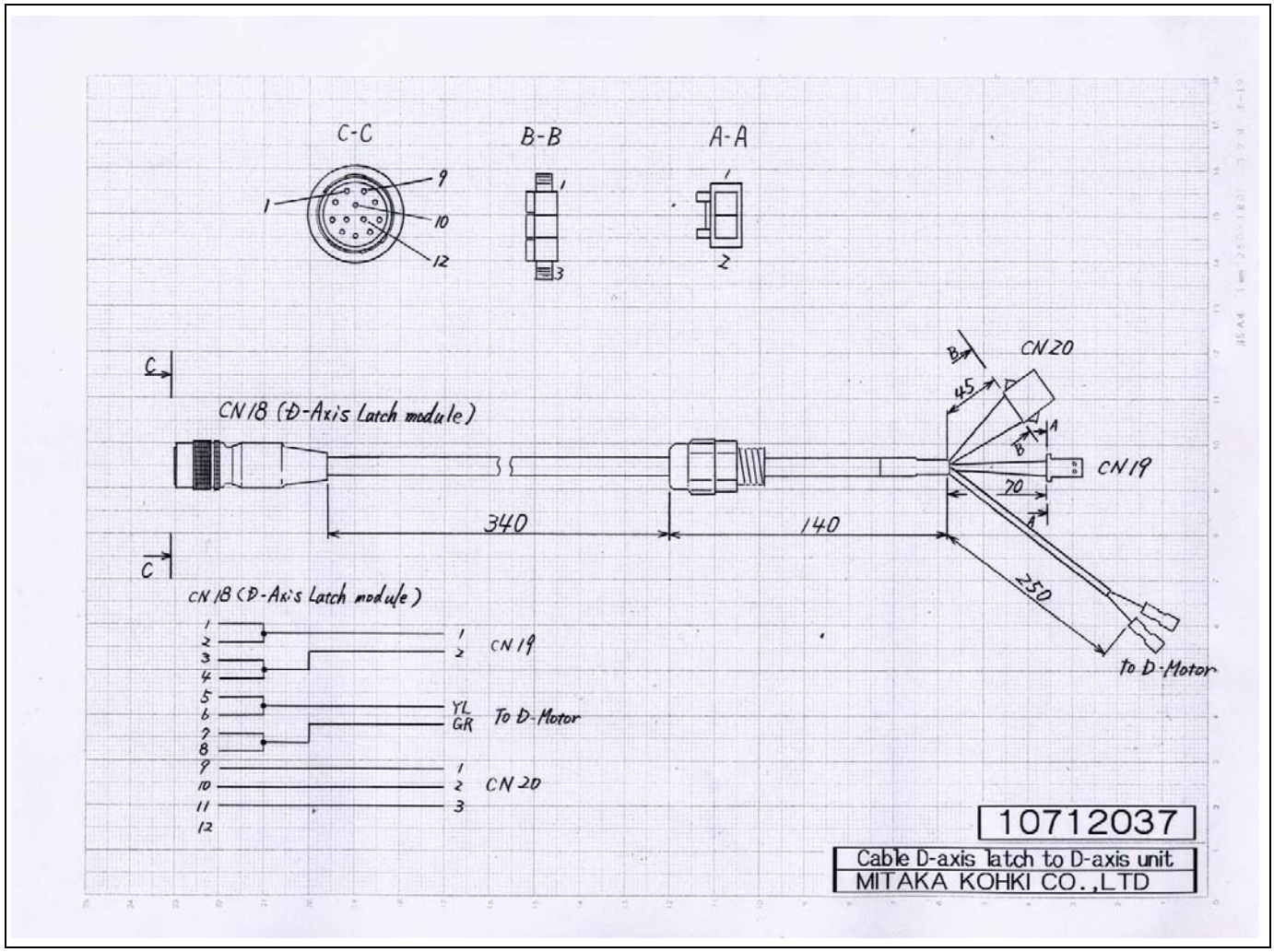




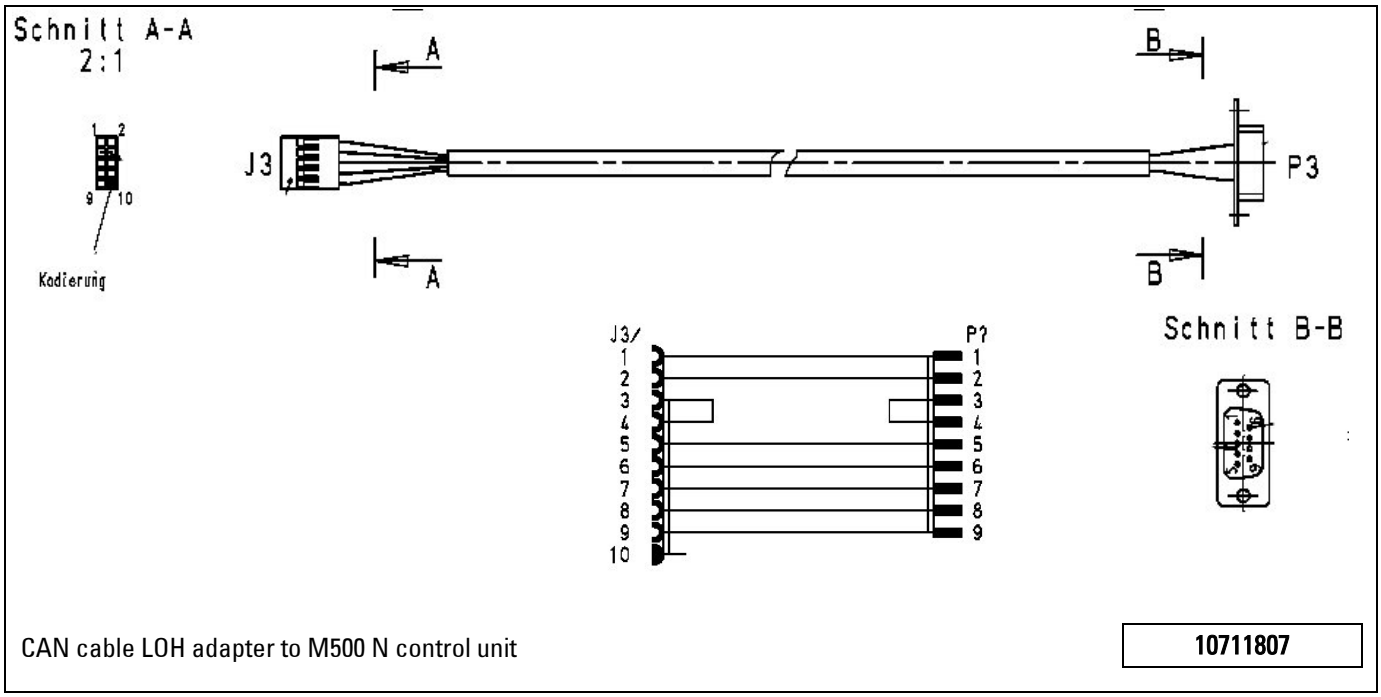
Stock n°	Description / Specification	Remark	Drawing



Stock n°	Description / Specification	Remark	Drawing



Stock n°	Description / Specification	Remark	Drawing

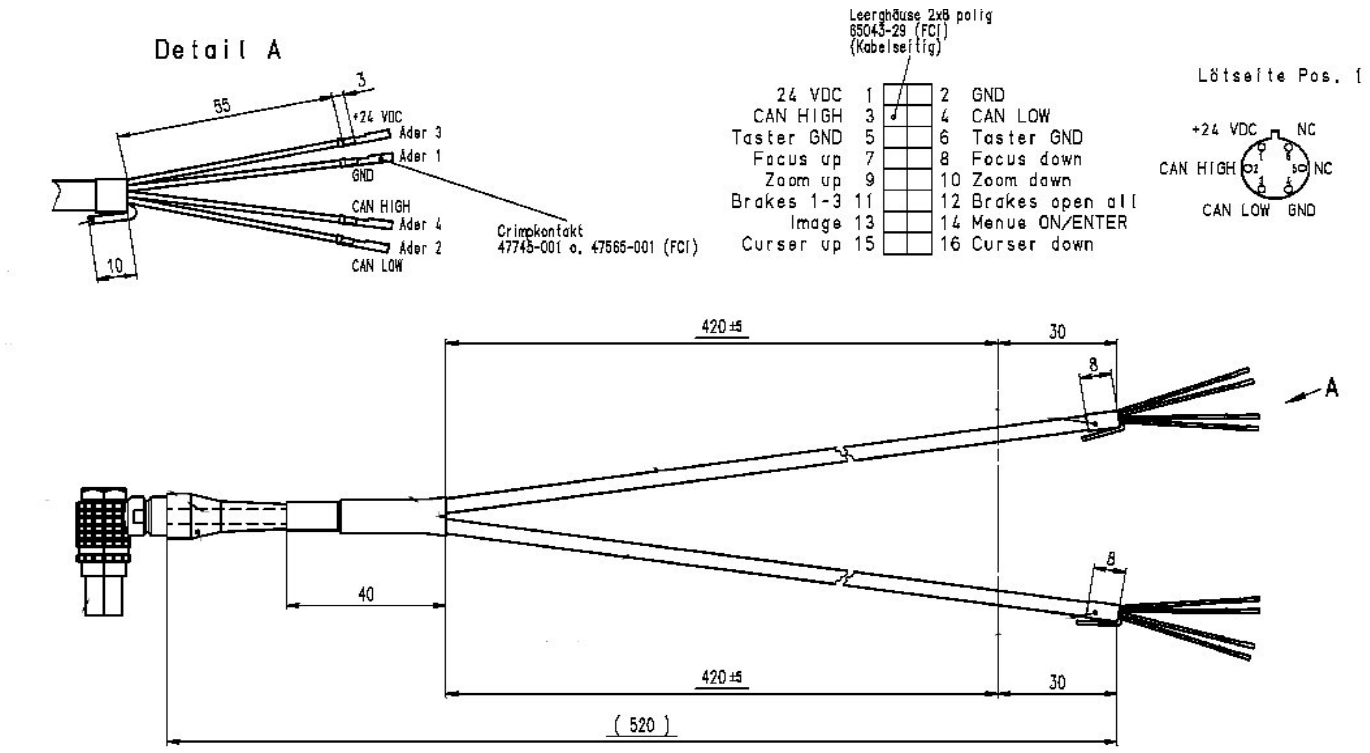


CAN cable LOH adapter to M500 N control unit

10711807

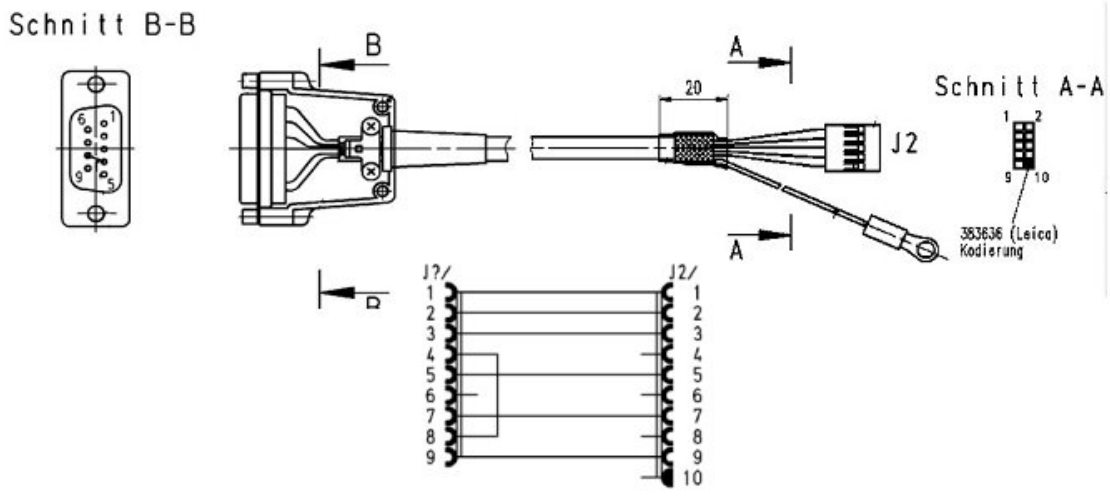
Up to serial number xxx above cable is needed.
Please refer to product improvement list; beginning with serial number yyy there will be a different cable assembled.

Stock n°	Description / Specification	Remark	Drawing



Y cable handgrips

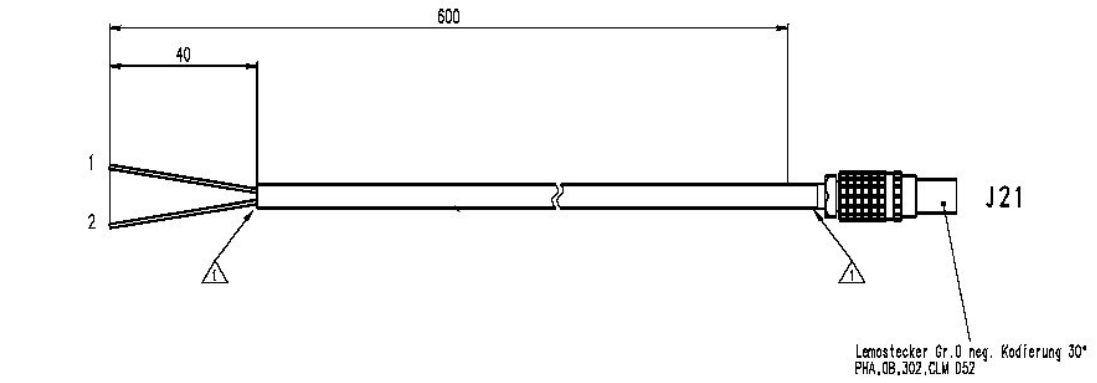
10711881



CAN cable optics carrier to LOH adapter

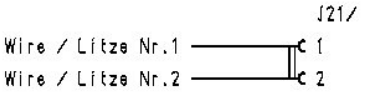
10711806

Stock n°	Description / Specification	Remark	Drawing



⚠1 Wire / Litze Nr.3,4,5 cut off / abgeschnitten

Check connector pinout and shield conductivity

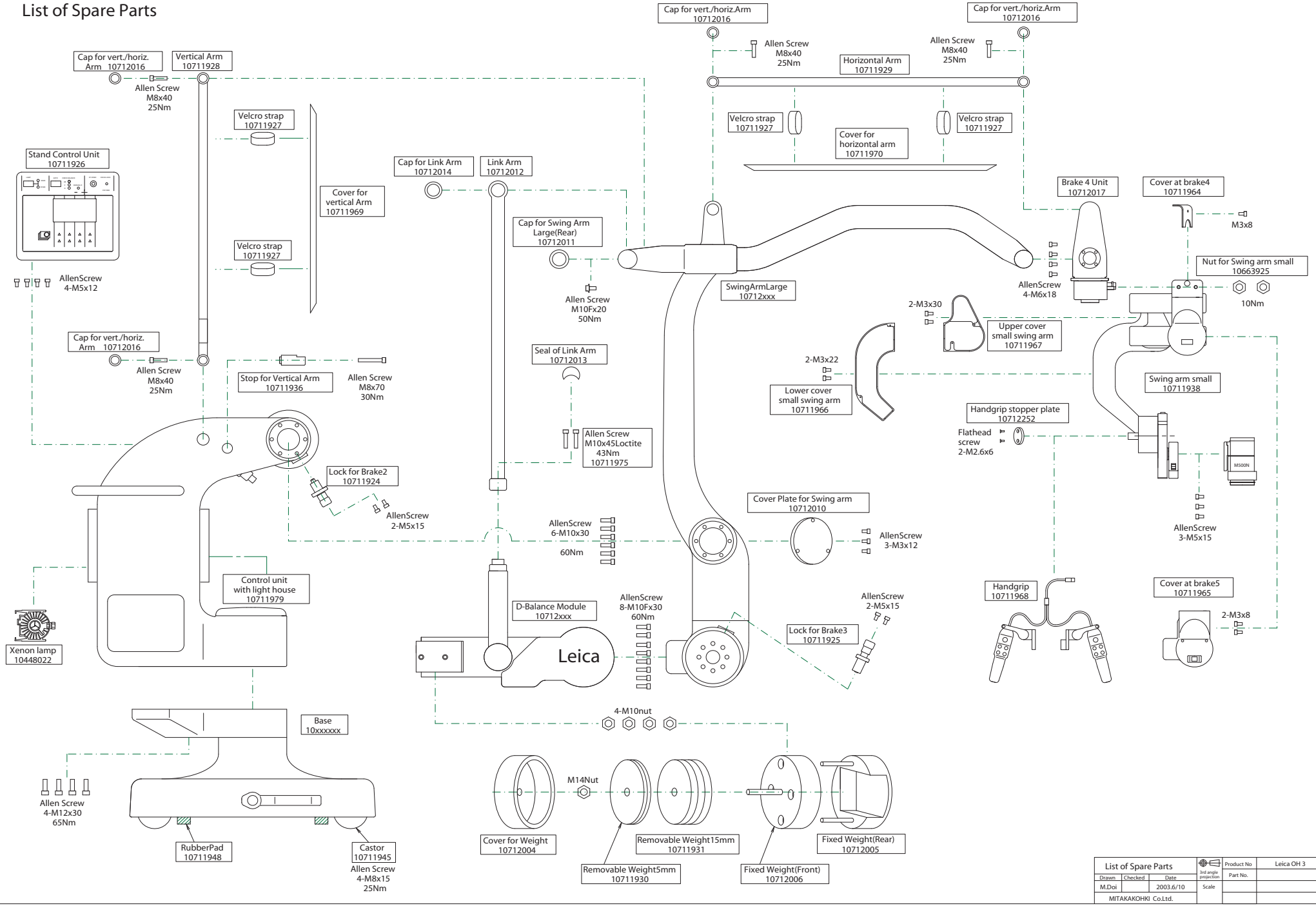


Cable for mouthswitch

10711808

Some other internal cables are not defined until now. If needed, they will be defined later.

List of Spare Parts



List of Spare Parts				Product No	Leica OH 3
Drawn	Checked	Date	3rd angle projection	Part No.	
M.Doi		2003.6/10	Scale		
MITAKAKOHKI Co.Ltd.					